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MINERALS YEARBOOK

1960

Volume 2 of Three Volumes

FUELS

Prepared by the staff of the

BUREAU OF MINES

DIVISION OF PETROLEUM

DIVISION OF BITUMINOUS COAL

DIVISION OF ANTHRACITE

UNITED STATES DEPARTMENT OF THE INTERIOR

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FOREWORD

MINERALS YEARBOOK, 1960, published in three volumes, provides a record of performance of the Nation's mineral industries during the year, with enough background information to interpret the year's developments.

The three-volume issues of the Yearbook follow this pattern:

Volume I includes chapters on metal and nonmetal mineral commodities except mineral fuels. In addition, it includes a chapter reviewing these mineral industries, a statistical summary, and chapters on mining and metallurgical technology, employment and injuries, and technologic trends. One new chapter, High-Purity Silicon, has been added to the list of commodity chapters. The chapter on Nonferrous Secondary Metals has been discontinued and the statistical material in it distributed to the appropriate nonferrous metals commodity chapters.

Volume II includes chapters on each mineral fuel, an employment and injuries presentation, and a mineral-fuels review chapter that summarizes developments in the fuel industries.

Volume III contains chapters covering each of the 50 States, plus chapters on island possessions in the Pacific Ocean and the Commonwealth of Puerto Rico and island possessions in the Caribbean Sea, including the Canal Zone. Volume III also has a statistical summary chapter, identical with that in Volume I, and a chapter on employment and injuries.

The data in the Minerals Yearbook are based largely upon information supplied by mineral producers, processors, and users, and acknowledgment is made of this indispensable cooperation given by industry. Information obtained from individuals through confidential surveys has been grouped to provide statistical aggregates. Data on individual producers are presented only if available from published or other nonconfidential sources, or when permission of the individuals concerned has been granted.

MARLING J. ANKENY, *Director*.

ACKNOWLEDGMENTS

The chapters in this volume of the MINERALS YEARBOOK were prepared by the staffs of several divisions in the Bureau. Those on bituminous coal and its products were prepared under the general supervision of T. Reed Scollon, chief, Division of Bituminous Coal, and T. W. Hunter, chief, Branch of Bituminous-Coal Economics and Statistics; the chapters on petroleum and related commodities were prepared under the general supervision of R. A. Cattell, chief, Division of Petroleum, and D. S. Colby, chief, Branch of Petroleum Economics; the anthracite chapter was prepared under the general direction of Joseph A. Corgan, chief, Division of Anthracite; the helium chapter was prepared under the direction of Henry P. Wheeler, Jr., Assistant Director—Helium. Preparation of this volume was coordinated by Virgil L. Barr, Executive Assistant to the Chief, Division of Petroleum, and Thelma K. Stewart, editorial assistant.

Because of the many sources of data presented, the Bureau cannot credit each individually, but acknowledgment is made of the splendid cooperation of producers and users of fuels who supplied information and of the business press, trade associations, scientific journals, international organizations, and State and Federal agencies. The Bureau of the Census, U.S. Department of Commerce, furnished data on foreign trade from which the import and export tables in these chapters were compiled by the Bureau of Mines under the direction of M. B. Price, assisted by E. D. Page. World production tables were compiled under the direction of Berenice B. Mitchell from many sources including data from the U.S. Foreign Service, Department of State.

The mining and geology and related departments of the respective States have been most cooperative and have made available supplementary and verifying information regarding production and plant operations. For their assistance the Bureau is deeply grateful, and acknowledgment is made to the following State organizations that assisted with the canvasses of bituminous coal and lignite:

Alabama: Division of Safety and Inspection, Birmingham.
Alaska: Department of Natural Resources, Division of Mines and Minerals, Juneau.
Arizona: State mine inspector, Phoenix.
Arkansas: State mine inspector, Fort Smith.
Colorado: Colorado Coal Mine Inspection Department, Denver.
Georgia: Department of Mines, Mining, and Geology, State Division of Conservation, Atlanta.
Illinois: State Department of Mines and Minerals, Springfield.
Indiana: Bureau of Mines, Terre Haute.
Iowa: State mine inspectors, Des Moines.
Kansas: State Mine Inspection Division, Pittsburg.
Kentucky: Kentucky Department of Mines and Minerals, Lexington.
Maryland: Maryland Bureau of Mines, Westernport.
Missouri: Division of Mine Inspection, Jefferson City.
New Mexico: State inspector of mines, Albuquerque.

North Dakota: State coal-mine inspector, Bismarck.
Ohio: Division of Mines and Mining, Ohio Department of Industrial Relations, Columbus.
Oklahoma: Chief mine inspector, Oklahoma City.
Pennsylvania: Pennsylvania Department of Mines and Mineral Industries, Harrisburg.
Tennessee: Tennessee Division of Mines, Knoxville.
Utah: Safety Division, Industrial Commission of Utah, Salt Lake City.
Virginia: Division of Mines, Virginia Department of Labor and Industry, Big Stone Gap.
Washington: Chief coal-mine inspector, Department of Labor and Industries, Seattle.
West Virginia: West Virginia Department of Mines, Charleston.
Wyoming: State coal-mine inspector, Rock Springs.

Appreciation is also expressed to the Commonwealth of Pennsylvania Department of Mines and Mineral Industries, Harrisburg, and Commonwealth of Massachusetts, Division on Necessaries of Life, Boston, for assistance in acquiring data on anthracite and to the following for their assistance with the peat canvass:

Michigan: Department of Conservation, Lansing.
New Jersey: Department of Conservation and Economic Development, Bureau of Geology and Topography, Trenton.
Washington: Department of Conservation and Development, Olympia.

Credit is also due the following State organizations that assisted with the petroleum and natural gas canvasses:

Arkansas: Arkansas Oil and Gas Commission, El Dorado. Department of Revenue, Little Rock.
California: California Department of Natural Resources, San Francisco. Public Utilities Commission, State of California, San Francisco.
Illinois: Oil and Gas Division and State Geological Survey Division, Urbana.
Kansas: Conservation Division, State Corporation Commission, Wichita. State Geological Survey, University of Kansas, Lawrence.
Louisiana: Louisiana Department of Conservation, Baton Rouge.
Maryland: Department of Geology, Mines, and Water Resources, Baltimore.
Michigan: Geological Survey Division, Department of Conservation, Lansing.
Mississippi: Mississippi, State Oil and Gas Board, Jackson. Oil and Gas Severance Tax Division, Mississippi State Tax Commission, Jackson.
Missouri: Division of Geological Survey and Water Resources, Department of Business and Administration, Rolla. Geological Survey and Water Resources, Rolla.
New York: New York State Science Service, Albany.
North Dakota: North Dakota, Geological Survey, Grand Forks.
Ohio: Oil and Gas Section, Department of Natural Resources, Columbus.
Oklahoma: Oil and Gas Conservation Department, Oklahoma Corporation Commission, Oklahoma City. Gross Production Tax Department, Oklahoma Tax Commission, Oklahoma City.
Tennessee: Division of Geology, Department of Conservation, Nashville.
Texas: Oil and Gas Division, Railroad Commission of Texas, Austin. Oil and Gas Division, State Comptroller of Public Accounts, Austin.
Virginia: Geological Survey Division, Department of Conservation and Development, Charlottesville.
West Virginia: Geological and Economic Survey, Morgantown.

Grateful acknowledgment is made to the American Iron and Steel Institute, New York, N.Y.; the Anthracite Institute, Wilkes-Barre, Pa.; the Association of American Railroads, Washington, D.C.; the Upper Lake Docks Coal Bureau, Inc., St. Paul, Minn.; the Ore and Coal Exchange, Cleveland Ohio; the National Association of Packaged Fuel Manufacturers, Topeka, Kans.; and the many other trade and industry associations that have provided data.

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PART I GENERAL REVIEWS

Review of the Mineral-Fuel Industries in 1960

By Robert E. Johnson, Jr.,[1] and T. W. Hunter[2]

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GENERAL SUMMARY

THE NATION'S economy entered 1960 on a note of distinct optimism. Recovery and expansion from the 1957–58 recession, interrupted in 1959 by the extended steel strike, were expected to resume. In the anticipation of increased sales, inventories were being expanded at an annual rate of almost $10 billion in the first quarter. As it became evident that sales expectations were not being realized, both inventory investment and production slowed. The Federal Reserve Board (FRB) index of iron and steel manufacturers declined throughout the year, from 149 in January to 80 in December. The recession was concentrated in durable manufacturers and inventories. Both the general economy and mineral fuels fared better. Real gross national product for the year increased almost 3 percent, while the value of mineral fuels production, affected by the slowdown in durable manufactures, increased only 2 percent. Calculated consumption of mineral-energy fuels increased more than production, chiefly because of a reduction in stocks during the year. Mineral fuel prices were relatively stable throughout the year, wholesale prices increasing slightly while average unit mine value decreased slightly.

Employment declined throughout the year, particularly in coal mining and coke manufacturing. Weekly hours and earnings held about steady. The combination of reduced employment and stable earnings rates resulted in a reduction in the national income originating in the mineral-fuels industry. Costs per unit of output, both labor costs and cost of supplies, decreased. For crude petroleum and natural gas this is the second consecutive decline, a reversal of a trend that moved the Bureau of Mines index of major input expenses from 100 in 1950 to 134 in 1958. The trend for a decade in anthracite has

[1] General economist.
[2] Chief, Branch of Bituminous Coal Economics and Statistics.

been down, whereas the movement in bituminous coal costs has been irregular, with costs somewhat lower in 1960 than they were in 1950. There was little change in mineral-fuel imports and exports in 1960. The value of crude imports rose but was offset by decreases in petroleum products. Although the volume of coal exports remained virtually unchanged, their value decreased by more than 6 percent. Internal freight rates changed little, bituminous coal down and anthracite up. Downward pressure on international tanker rates continued as rates dropped for the third year in a row.

DOMESTIC PRODUCTION

Changes in the domestic production of fuels and energy may be measured in several ways. Table 1 summarizes the total energy production from mineral fuels and waterpower in the United States in terms of British thermal unit (B.t.u.) content of the various sources (see also figs. 1 and 2). The values of mineral-fuel production are summarized in table 2; and the actual physical volume of production, in the usual physical units used for each commodity, with values, is given in table 3. Finally, indexes of physical volume of production, weighted by values, are listed in tables 4 and 5. Since these measures are directed to different aspects of the fuels industries, it is not surprising that these measures sometimes move disparately. Total energy production, measured in British thermal units, was 2.2 percent higher than in 1959. Actual physical quantities (B.t.u.) of produc-

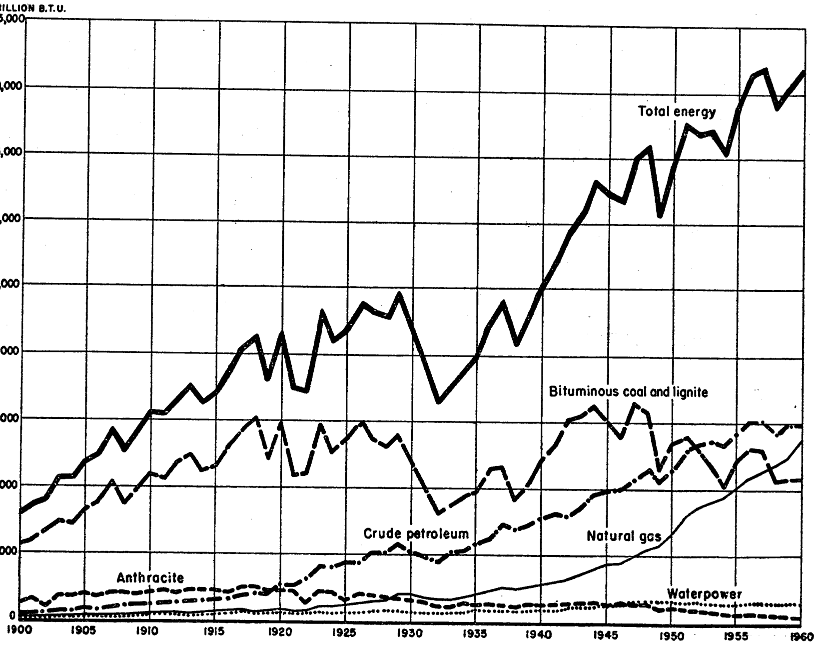

FIGURE 1.—Production of mineral-energy fuels and energy from waterpower in the United States 1900–1960.

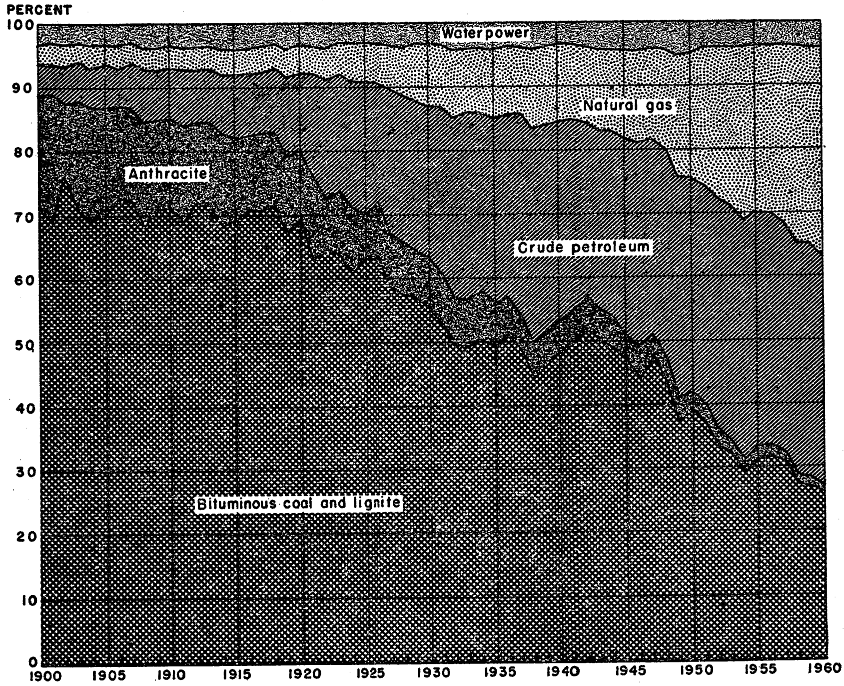

FIGURE 2.—Percentage of total production of British thermal units equivalent of mineral-energy fuels and energy from waterpower in the United States, 1900–1960.

tion showed four increases and one decrease. The value of mineral-fuel production increased by $651 million, a 4-percent increase. The Bureau of Mines index of physical volume of mineral-fuel production increased 0.8; the FRB Index decreased 1 point.

Total Energy.—Total production of mineral-energy fuels and energy from waterpower in the United States in 1960 increased to 41,844 trillion B.t.u. As indicated in table 1 and figure 1, all fuels increased except anthracite; energy from waterpower also increased. Bituminous coal and lignite increased 0.8 percent, crude petroleum remained constant, natural gas increased 6.0 percent, and anthracite declined 8.9 percent.

Value of Production.—Mineral-fuel production value increased by 4 percent in 1960, largely because of increases in physical quantity of production.

Domestic Production.—Production of the important mineral fuels increased in 1960. Production increases occurred in gilsonite, bituminous coal and lignite, helium, natural gas, natural gas liquids including LP gases, and peat. The volume of crude petroleum was practically unchanged. Except for a decrease in the relatively minor item bituminous limestone and sandstone, the only decrease was in anthracite.

Indexes of Physical Production.—The Bureau of Mines index of the physical volume of mineral production in the United States is com-

TABLE 1.—Production of mineral energy fuels and energy from waterpower, in trillion British thermal units and percentage contributed by each in the United States [1]

Year	Bituminous coal and lignite [2]	Anthracite	Crude petroleum	Natural gas, wet	Water-power	Grand total	Percentage					
							Bituminous coal and lignite	Anthracite	Crude petroleum	Natural gas, wet	Water-power	Total
1900	5,563	1,457	369	254	250	7,983	70.5	18.4	4.7	3.2	3.2	100.0
1905	8,255	1,973	781	377	386	11,772	70.1	16.8	6.6	3.2	3.3	100.0
1910	10,928	2,146	1,215	547	539	15,375	71.1	14.0	7.9	3.5	3.5	100.0
1915	11,597	2,260	1,630	676	659	16,822	69.0	13.4	9.7	4.0	3.9	100.0
1920	14,899	2,276	2,569	883	738	21,365	69.7	10.7	12.0	4.1	3.5	100.0
1921	10,897	2,298	2,739	732	620	17,286	63.0	13.3	15.9	4.2	3.6	100.0
1922	11,063	1,389	3,234	843	643	17,172	64.5	8.1	18.8	4.9	3.7	100.0
1923	14,792	2,371	4,248	1,113	685	23,209	63.7	10.2	18.3	4.8	3.0	100.0
1924	12,672	2,233	4,141	1,263	648	20,957	60.5	10.6	19.8	6.0	3.1	100.0
1925	13,625	1,570	4,430	1,314	668	21,607	63.1	7.2	20.5	6.1	3.1	100.0
1926	15,020	2,145	4,471	1,452	728	23,816	63.1	9.0	18.8	6.1	3.0	100.0
1927	13,565	2,034	5,227	1,598	776	23,200	58.5	8.8	22.5	6.9	3.3	100.0
1928	13,120	1,914	5,229	1,734	854	22,851	57.4	8.4	22.9	7.6	3.7	100.0
1929	14,017	1,875	5,842	2,118	816	24,668	56.8	7.6	23.7	8.6	3.3	100.0
1930	12,249	1,762	5,208	2,148	752	22,119	55.4	8.0	23.5	9.7	3.4	100.0
1931	10,011	1,515	4,936	1,869	668	18,999	52.7	8.0	26.0	9.8	3.5	100.0
1932	8,114	1,266	4,554	1,729	713	16,376	49.5	7.7	27.8	10.6	4.4	100.0
1933	8,741	1,258	5,253	1,733	711	17,696	49.4	7.1	29.7	9.8	4.0	100.0
1934	9,415	1,452	5,267	1,970	698	18,802	50.1	7.7	28.0	10.5	3.7	100.0
1935	9,756	1,325	5,780	2,136	806	19,803	49.2	6.7	29.2	10.8	4.1	100.0
1936	11,504	1,386	6,378	2,411	812	22,491	51.2	6.1	28.4	10.7	3.6	100.0
1937	11,673	1,317	7,419	2,684	871	23,964	48.7	5.5	31.0	11.2	3.6	100.0
1938	9,132	1,171	7,043	2,565	866	20,777	44.0	5.6	33.9	12.3	4.2	100.0
1939	10,345	1,308	7,337	2,763	838	22,591	45.8	5.8	32.5	12.2	3.7	100.0
1940	12,072	1,308	7,849	2,979	880	25,088	48.1	5.2	31.3	11.9	3.5	100.0
1941	13,471	1,432	8,133	3,162	934	27,132	49.6	5.3	30.0	11.7	3.4	100.0
1942	15,267	1,532	8,043	3,436	1,136	29,414	51.9	5.2	27.3	11.7	3.9	100.0
1943	15,463	1,540	8,733	3,839	1,304	30,879	50.1	5.0	28.3	12.4	4.2	100.0
1944	16,233	1,618	9,732	4,176	1,344	33,103	49.0	4.9	29.4	12.6	4.1	100.0
1945	15,134	1,395	9,939	4,423	1,442	32,333	46.8	4.3	30.7	13.7	4.5	100.0

1946	13,989	1,537	10,057	4,550	1,406	31,539	44.3	4.9	31.9	14.4	4.5	100.0
1947	16,522	1,453	10,771	5,012	1,426	35,184	47.0	4.1	30.6	14.2	4.1	100.0
1948	15,707	1,451	11,717	5,615	1,481	35,971	43.7	4.0	32.6	15.6	4.1	100.0
1949	11,472	1,085	10,683	5,911	1,539	30,690	37.4	3.5	34.8	19.3	5.0	100.0
1950	13,527	1,120	11,449	6,841	1,573	54,510	39.2	3.2	33.2	19.8	4.6	100.0
1951	13,982	1,084	13,037	8,106	1,559	37,768	37.0	2.9	34.5	21.5	4.1	100.0
1952	12,231	1,031	13,282	8,705	1,581	36,830	33.2	2.8	36.1	23.6	4.3	100.0
1953	11,981	786	13,671	9,116	1,522	37,076	32.3	2.1	36.9	24.6	4.1	100.0
1954	10,262	739	13,427	9,488	1,449	35,365	29.0	2.1	38.0	26.8	4.1	100.0
1955	12,174	665	14,410	10,204	1,447	38,900	31.3	1.7	37.1	26.2	3.7	100.0
1956	13,123	734	15,181	10,930	1,542	41,510	31.6	1.8	36.6	26.3	3.7	100.0
1957	12,909	644	15,178	11,571	1,524	41,826	30.9	1.5	36.3	27.7	3.6	100.0
1958	10,754	538	14,204	11,943	1,693	39,132	27.5	1.4	36.3	30.5	4.3	100.0
1959	10,795	524	14,932	13,036	1,645	40,932	26.4	1.3	36.5	31.8	4.0	100.0
1960	10,886	478	[3] 14,935	13,822	[3] 1,723	41,844	26.0	1.2	[3] 35.7	33.0	[3] 4.1	100.0

[1] The unit heat values employed are: Anthracite, 12,700 B.t.u. per pound; bituminous coal and lignite, 13,100 B.t.u. per pound; petroleum, 5,800,000 B.t.u. per barrel; natural gas, total production × 1,075 B.t.u. minus repressuring vent and waste gas × 1,035. Waterpower includes installations owned by manufacturing plants and mines as well as Government and privately owned public utilities. The fuel equivalent of waterpower is calculated from the kilowatt-hours of power produced wherever available, as is true of all public-utility plants since 1919. Otherwise, the fuel equivalent is calculated from the reported horsepower of installed water wheels, assuming a capacity factor of 20 percent for factories and mines and 40 percent for public utilities.

[2] Alaska included for all years.

[3] Preliminary, 50-State basis.

TABLE 2.—Value of mineral production in United States by mineral groups [1]

(Million dollars)

Mineral groups	1951-55 (average)	1956	1957	1958	1959	1960	Change in 1960 from 1959 (percent)
Metals and nonmetals except fuels:							
Nonmetals	2,432	3,266	3,267	3,346	[2] 3,721	3,730	0
Metals	1,728	2,358	2,137	1,593	1,570	2,021	+29
Total	4,160	5,624	5,404	4,939	[2] 5,291	5,751	+9
Mineral fuels	10,066	11,741	12,709	11,589	[2] 11,950	12,141	+2
Grand total	14,226	17,365	18,113	16,528	[2] 17,241	17,892	+4

[1] Beginning with 1953, Alaska and Hawaii are included.
[2] Revised.

TABLE 3.—Mineral fuels production in the United States [1]

Mineral	1957 Short tons (unless otherwise stated)	1957 Value (thousands)	1958 Short tons (unless otherwise stated)	1958 Value (thousands)
Asphalt and related bitumens (native):				
Bituminous limestone and sandstone	1,168,507	$3,221	1,326,493	$3,343
Gilsonite	207,704	4,259	317,280	4,864
Carbon dioxide, natural (estimated) thousand cubic feet	704,276	139	722,615	102
Coal:				
Bituminous and lignite [2] thousand short tons	492,704	2,504,406	410,446	1,996,281
Pennsylvania anthracite do	25,338	227,754	21,171	187,898
Helium thousand cubic feet	310,365	5,112	352,134	5,741
Natural gas million cubic feet	10,680,258	1,201,759	11,030,298	1,317,492
Natural gas liquids:				
Natural gasoline and cycle products thousand gallons	5,734,307	415,791	5,596,458	393,139
LP gases do	6,555,282	263,665	6,783,000	296,571
Peat	316,217	3,458	327,813	3,446
Petroleum (crude) thousand 42-gallon barrels	2,616,901	8,079,259	2,449,016	7,380,065
Total mineral fuels		12,709,000		11,589,000
Total all other minerals		5,404,000		4,939,000
Grand total, mineral production		18,113,000		16,528,000

Mineral	1959 Short tons (unless otherwise stated)	1959 Value (thousands)	1960 Short tons (unless otherwise stated)	1960 Value (thousands)
Asphalt and related bitumens (native):				
Bituminous limestone and sandstone	1,518,765	$3,868	1,242,874	$3,070
Gilsonite	379,362	9,385	383,037	10,020
Carbon dioxide, natural (estimated) thousand cubic feet	[3] 485,179	71	521,169	99
Coal:				
Bituminous and lignite [2] thousand short tons	412,028	1,965,607	415,512	1,950,425
Pennsylvania anthracite do	20,649	172,320	18,817	147,116
Helium thousand cubic feet	375,408	6,144	475,179	7,768
Natural gas million cubic feet	12,046,115	1,556,800	12,771,038	1,789,970
Natural gas liquids:				
Natural gasoline and cycle products thousand gallons	5,597,102	408,694	5,842,507	416,819
LP gases do	7,874,706	349,802	8,444,074	391,566
Peat	419,460	4,372	470,889	5,138
Petroleum (crude) thousand 42-gallon barrels	2,574,590	[3] 7,473,336	[4] 2,574,933	[4] 7,419,382
Total mineral fuels		[3] 11,950,000		12,141,000
Total all other minerals		[3] 5,291,000		5,751,000
Grand total, mineral production		[3] 17,241,000		17,892,000

[1] Includes Alaska and Hawaii.
[2] Includes small quantity of anthracite mined in States other than Pennsylvania.
[3] Revised figure.
[4] Preliminary figure.

TABLE 4.—Indexes of the physical volume of mineral production in the United States, by groups and subgroups [1]

(1947–49=100)

	All minerals	Fuels			Metals	Nonmetals
		Total	Coal	Crude oil and natural gas [2]		
1951	112.6	110.1	93.6	119.9	117.2	127.3
1952	110.9	107.8	82.7	122.8	112.7	132.1
1953	112.6	108.8	78.8	126.6	119.1	135.2
1954	107.9	104.0	68.1	125.4	97.6	146.4
1955	119.0	113.8	78.7	134.6	115.0	161.0
1956	125.8	120.5	85.0	141.7	117.1	172.6
1957	126.1	120.3	82.9	142.5	118.8	175.7
1958	115.5	110.2	69.0	134.7	90.8	176.2
1959	[3] 119.6	[3] 114.5	[3] 69.1	[3] 141.5	82.2	190.7
1960	122.6	115.3	69.2	142.8	104.6	192.2

[1] For general description of index, see Minerals Yearbook 1956, vol. I, Review of the Mineral Industries, pp. 2–5. Indexes for components of the fuels index go back to 1880 (the initial year of the overall index) in Minerals Yearbook 1958, vol. II, pp. 9–10.
[2] Does not cover isopentane, LP gases, and other natural gas liquids.
[3] Revised figures.

TABLE 5.—Indexes of industrial production, mineral fuels, seasonally adjusted [1]

(1957=100)

	Total mineral fuels	Coal	Crude oil and natural gas	Total industrial production
1956	99	103	100	99
1957	100	100	100	100
1958	92	83	94	93
1959	96	82	99	105
1960	95	82	98	108
January	98	91	99	111
February	95	84	98	110
March	94	86	96	109
April	95	87	97	109
May	94	86	96	110
June	95	78	99	109
July	96	78	100	110
August	96	80	100	108
September	95	77	99	107
October	96	81	99	106
November	97	77	101	105
December	96	81	99	103

[1] Federal Reserve Bulletin.

prehensive and uses shifting weights to reflect the changing patterns of production and consumption as the economy grows and changes. The total fuels index rose less than 1 percent in 1960 compared to a 4-percent increase in 1959. Petroleum and natural gas accounted for the shift, rising 5 percent in 1959 and less than 1 percent in 1960.

The FRB indexes of production, which are available monthly, exhibit behavior parallel with the Bureau of Mines index. The FRB indexes, table 5, adjusted seasonally, show three slightly different pictures of a year of mild recession. The coal component drifts irregularly downward for the whole year, crude oil and natural gas remain unchanged throughout, and the total index holds level for the first half, dropping away slowly but steadily during the second half.

CONSUMPTION

Consumption of mineral fuels is measured both in British thermal unit content and in the physical units usual for the commodity concerned. Both measures indicate increases for natural gas, bituminous coal, and petroleum and a decline for anthracite in 1960.

Calculated Energy Consumption.—Total energy consumption expressed in British thermal units increased 3.6 percent in 1960. Consumption of energy is historically closely correlated with changes in gross national product, and the increase in 1960 reflects the increase in gross national product during the year. The coal share of the energy market remained constant in 1960, at least a temporary halt in the long-term shift from coal to oil and gas in the energy economy. The percent of the market supplied by natural gas and natural gas liquids continued to increase, an increase matched by an equal decrease in the petroleum component of the market.

Consumption Patterns.—Both cyclical and long-term trend factors affect the demand for fuels. Except in the case of coke, long-term influences were dominant in 1960. The growth of demand for petroleum and petroleum products closely parallels the overall growth of the economy. On the other hand the secular trend for both natural gas and anthracite differs significantly from the overall pattern. Natural gas consumption is rising faster than either the energy economy or the general economy, as it penetrates markets once held by coal and petroleum. The long-term decline in the demand for anthracite continued.

The strong growth rate in the demand for coal by the electric utilities accounted for more than half of the increased consumption of bituminous coal during the year, but all consumption categories increased except Class I railroads, cement mills, and bunkers. These last three account for less than 3 percent of demand.

Space-heating and household markets use most of the anthracite consumed in the United States. Demand in this market has been declining for a number of years, a decline that continued in 1960. The other significant markets for anthracite are electric utilities, the iron and steel industry, and exports. The decline in demand was accounted for almost entirely by household demand and exports.

Sales of natural gas, by consumer groups, were higher than 1959 in all categories. While the totals sales of fuel oil also were greater than 1959, several groups showed declines, the most significant being smelters, mines, manufactures, and vessels.

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TABLE 6.—Calculated consumption of energy fuels and energy from waterpower, in trillion British thermal units and percentage contributed by each in the United States[1]

Year	Bituminous coal and lignite	Anthracite	Crude oil	Petroleum products net: E, exported; I, imported	Natural gas, dry	Natural gas liquids	Waterpower	Grand total	Percentage: Bituminous coal and lignite	Percentage: Anthracite	Percentage: Crude oil	Percentage: Petroleum products net: E, exported; I, imported	Percentage: Natural gas, dry	Percentage: Natural gas liquids	Percentage: Waterpower	Percentage: Total
1920	13,325	2,179	3.027	E 393	827	42	775	19,782	67.4	11.0	15.3	E 2.0	4.2	0.2	3.9	100.0
1921	10,266	2,082	3,016	E 342	682	50	656	16,410	62.6	12.7	18.4	E 2.1	4.1	.3	4.0	100.0
1922	11,185	1,443	3,390	E 319	785	56	675	17,215	65.0	8.4	19.7	E 1.9	4.6	.3	3.9	100 0
1923	13,598	2,208	4,419	E 389	1,032	90	727	21,685	62.7	10.2	20.4	E 1.8	4.8	.4	3.3	100.0
1924	12,681	2,050	4,228	E 464	1,170	103	685	20,453	62.0	10.0	20.7	E 2.3	5.7	.5	3.4	100.0
1925	13,079	1,627	4,641	E 485	1.212	124	701	20,899	62.6	7.8	22.2	E 2.3	5.8	.6	3.3	100.0
1926	13,954	1,961	4,876	E 545	1,335	149	765	22,495	62.0	8.7	21.7	E 2.4	5.9	.7	3.4	100.0
1927	13,095	1,897	5,027	E 650	1,465	179	815	21,828	60.0	8.7	23.0	E 3.0	6.7	.8	3.8	100.0
1928	13,069	1,871	5,474	E 711	1,588	200	890	22,381	58.4	8.4	24.4	E 3.2	7.1	.9	4.0	100.0
1929	13,612	1,815	5,894	E 600	1,942	246	847	23,756	57.3	7.6	24.8	E 2.5	8.2	1.0	3.6	100.0
1930	11,921	1,718	6,148	E 496	1,969	243	785	22,288	53.5	7.7	27.6	E 2.2	8.8	1.1	3.5	100.0
1931	9,743	1,484	5,304	E 339	1,715	200	692	18,799	51.8	7.9	28.2	E 1.8	9.1	1.1	3.7	100.0
1932	8,041	1,283	4,830	E 240	1,594	158	726	16,392	49.1	7.8	29.5	E 1.5	9.7	1.0	4.4	100.0
1933	8,323	1,260	5,143	E 299	1,600	144	729	16,900	49.2	7.5	30.4	E 1.8	9.5	.9	4.3	100.0
1934	9,008	1,410	5,136	E 318	1,819	161	721	17,937	50.2	7.9	28.6	E 1.8	10.2	.9	4.0	100.0
1935	9,336	1,298	5,799	E 300	1,974	169	831	19,107	48.9	6.8	30.4	E 1.6	10.3	.9	4.3	100.0
1936	10,697	1,351	6,426	E 302	2,221	184	841	21,418	49.9	6.3	30.0	E 1.4	10.4	.9	3.9	100.0
1937	11,286	1,280	7,004	E 400	2,468	208	905	22,751	49.6	5.6	30.8	E 1.7	10.8	.9	4.0	100.0
1938	8,811	1,148	6,921	E 456	2,348	209	899	19,880	44.3	5.8	34.8	E 2.3	11.8	1.1	4.5	100.0
1939	9,854	1,262	7,327	E 486	2,539	221	872	21,589	45.6	5.9	33.9	E 2.2	11.8	1.0	4.0	100.0
1940	11,290	1,245	7,662	E 175	2,726	243	917	23,908	47.2	5.2	32.1	E .7	11.4	1.0	3.8	100.0
1941	12,893	1,338	8,343	E 139	2,851	364	975	26,625	48.4	5.0	31.3	E .5	10.7	1.4	3.7	100.0
1942	14,149	1,435	7,987	E 320	3,102	367	1,177	27,897	50.7	5.2	28.6	E 1.1	11.1	1.3	4.2	100.0
1943	15,557	1,450	8,538	E 310	3,481	379	1,347	30,442	51.1	4.8	28.1	E 1.0	11.4	1.2	4.4	100.0
1944	15,447	1,509	9,923	E 662	3,775	442	1,387	31,821	48.5	4.7	31.2	E 2.1	11.9	1.4	4.4	100.0
1945	14,661	1,311	10,199	E 580	3,973	491	1,486	31,541	46.5	4.2	32.3	E 1.8	12.6	1.5	4.7	100.0
1946	13,110	1,369	10,270	E 283	4,089	493	1,446	30,494	43.0	4.5	33.7	E .9	13.4	1.6	4.7	100.0
1947	14,302	1,224	11,065	E 262	4,518	564	1,459	32,870	43.5	3.7	33.7	E .8	13.8	1.7	4.4	100.0
1948	13,622	1,275	12,085	E 147	5,033	619	1,507	33,994	40.1	3.8	35.5	E .4	14.8	1.8	4.4	100.0
1949	11,673	958	11,402	I 57	5,289	660	1,565	31,604	36.9	3.0	36.1	I .2	16.7	2.1	5.0	100.0

TABLE 6.—Calculated consumption of energy fuels and energy from waterpower, in trillion British thermal units and percentage contributed by each in the United States [1]—Continued

Year	Bituminous coal and lignite	Anthracite	Crude oil	Petroleum products net: E, exported: I, imported	Natural gas, dry	Natural gas liquids	Waterpower	Grand total	Percentage: Bituminous coal and lignite	Percentage: Anthracite	Percentage: Crude oil	Percentage: Petroleum products net: E, exported: I, imported	Percentage: Natural gas, dry	Percentage: Natural gas liquids	Percentage: Waterpower	Percentage: Total
1950	11,900	1,013	12,304	I 402	6,150	783	1,601	34,153	34.8	3.0	36.0	I 1.2	18.0	2.3	4.7	100.0
1951	12,285	940	13,867	I 107	7,248	874	1,592	36,913	33.3	2.5	37.6	I .3	19.6	2.4	4.3	100.0
1952	10,971	897	14,248	I 132	7,760	954	1,614	36,576	30.0	2.4	39.0	I .4	21.2	2.6	4.4	100.0
1953	11,182	711	14,912	I 180	8,156	1,006	1,550	37,697	29.7	1.9	39.5	I .5	21.6	2.7	4.1	100.0
1954	9,512	683	14,830	I 260	8,554	1,042	1,479	36,360	26.2	1.9	40.8	I .7	23.5	2.8	4.1	100.0
1955	11,104	599	15,956	I 372	9,232	1,196	1,497	39,956	27.8	1.5	39.9	I .9	23.1	3.0	3.8	100.0
1956	11,338	610	16,994	I 424	9,834	1,209	1,598	42,007	27.0	1.4	40.5	I 1.0	23.4	2.9	3.8	100.0
1957	10,838	528	16,960	I 368	10,416	1,242	1,568	41,920	25.8	1.3	40.5	I .9	24.8	3.0	3.7	100.0
1958	9,607	483	16,308	I 1,120	10,995	1,240	1,740	41,493	23.1	1.2	39.3	I 2.7	26.5	3.0	4.2	100.0
1959	9,596	478	16,994	I 1,313	11,991	1,348	1,691	43,411	22.1	1.1	39.2	I 3.0	27.6	3.1	3.9	100.0
1960	9,967	447	[2] 17,172	[2] I 1,444	12,736	1,427	[2] 1,766	44,959	22.2	1.0	[2] 38.2	[2] I 3.2	28.3	3.2	[2] 3.9	100.0

[1] The heat values employed are: Anthracite, 12,700 B.t.u. per pound; bituminous coal and lignite, 13,100 B.t.u. per pound; crude oil, 5,800,000 B.t.u. per barrel; weighted average British thermal units on petroleum products by using 5,248,000 gasoline, 5,670,000 kerosine, 5,825,000 distillate, 6,287,000 residual, 6,064,800 lubricants, 5,537,280 wax, 6,636,000 asphalt, and 5,796,000 miscellaneous; natural gas, dry, 1,035 B.t.u. per cubic foot; natural gas liquids weighted average British thermal units based on production: natural gasoline 110,000 B.t.u. per gallon, and LP gas 95,500 B.t.u. per gallon. Waterpower converted to coal equivalent at the prevailing rate of pounds of coal per kilowatt-hour each year at central electric stations.

[2] Preliminary, 50-State basis.

TABLE 7.—Apparent consumption of mineral fuels and related products

Commodity	1959	1960	Change from 1959 (percent)
Fuels:			
Bituminous coal ... million net tons	366.3	380.4	+3.8
Crude petroleum, runs to stills ... million barrels	2,917.7	[1] 2,952.5	+1.2
Natural gas ... billion cubic feet	11,820.0	12,509.4	+5.8
Anthracite ... million net tons	18.8	17.6	−6.4
Products:			
All oils, domestic demand [2] ... million barrels	[3] 3,449.7	[1] 3,541.8	+2.7
Coke ... million net tons	54.7	56.9	+4.0
Petroleum asphalt ... do	18.6	19.0	+2.2

[1] Preliminary.
[2] Domestic demand will vary from consumption because of substantial secondary and consumers' stocks not reported to the Bureau of Mines.
[3] Revised figure.

TABLE 8.—Consumption of bituminous coal and lignite in the United States, by major consumer groups

(Thousand net tons)

	Electric power utilities [1]	Class I railroads [2]	Coke plants	Steel and rolling mills	Cement mills	Other mining and manufacturing industries	Retail deliveries to other consumers	Bunker foreign and lake vessel [3]	Total
1959	165,788	2,600	79,181	6,674	8,510	73,396	29,138	969	366,256
1960	173,882	2,101	81,015	7,378	8,216	76,487	30,405	945	380,429

[1] Federal Power Commission.
[2] Association of American Railroads.
[3] U.S. Dept. of Commerce, Bureau of the Census.

TABLE 9.—Sales of fuel oil and natural gas in the United States, by major consumer groups

(Fuel oil—thousand barrels; natural gas—million cubic feet)

Product and year	Railroads	Vessels	Gas and electric power plants	Smelters, mines and manufactures	Space heating and cooking	Military	Oil-company fuel	Miscellaneous	Total
Distillate fuel oil:									
1959	87,802	19,250	5,005	33,380	415,521	11,394	8,642	77,998	658,992
1960	86,490	18,730	4,742	34,271	438,010	10,793	8,347	81,942	683,325
Residual fuel oil:									
1959	5,613	102,049	82,208	167,701	111,850	31,415	46,177	7,339	554,352
1960	5,610	94,084	85,408	157,270	125,088	31,724	45,061	6,291	550,536
Natural gas:									
1959			[1] 1,627	5,093	3,888		2,839		11,820
1960			[1] 1,724	5,484	4,123		2,902		12,509

[1] Memorandum entry, not additive; includes gas other than natural. Natural gas component included under smelters, mines, and manufactures.

STOCKS

Physical Stocks.—There was no overall pattern in the changes in the stock levels of the various mineral fuels during the year. The petroleum industry was able to reduce what were considered excessive inventories. In the anthracite industry, producers' stocks in ground storage were reduced more than 50 percent. Natural gas inventories were increased 15 percent. As more storage space becomes available close to consuming centers, natural gas inventories climb, allowing more efficient use of both the natural gas and natural gas pipelines.

TABLE 10.—Physical stocks of mineral fuels and products at yearend

(Producers' stocks, unless otherwise indicated)

	1960	1959	1958	1957	1956
Coal and related products:					
Bituminous and lignite [1] ----net tons--	76,898,317	79,654,678	80,263,680	85,503,119	82,888,617
Pennsylvania anthracite [2] -------do----	199,356	429,020	406,375	499,620	341,505
Coke ----------------------------do----	4,738,088	4,682,436	3,823,364	3,148,776	2,334,441
Petroleum and related products:					
Carbon black-------thousand pounds--	292,992	218,893	300,923	349,399	347,574
Crude petroleum and petroleum products--------------thousand barrels--	[3] 778,735	[3] 808,970	[3] 789,538	839,906	780,391
Crude petroleum-------------do----	[3] 239,800	[3] 257,129	262,742	281,813	266,014
Natural gas liquids----------do----	[3] 28,931	[3] 24,887	22,752	20,756	20,559
Gasoline---------------------do----	[3] 194,774	[3] 187,613	187,004	196,776	187,271
Distillate fuel oil-----------do----	[3] 138,455	[3] 151,164	125,508	149,449	133,981
Residual fuel oil------------do----	[3] 44,870	[3] 53,501	59,560	59,959	44,491
Petroleum asphalt-----------do----	[3] 10,142	[3] 10,948	9,757	10,463	9,150
Other refined products------do----	[3] 121,763	[3] 123,728	122,215	121,290	118,925
Natural gas [4] --------billion cubic feet--	2,184	1,901	1,764	1,674	1,502

[1] Stocks at industrial-consumer and retail yards and on upper Lake docks.
[2] Producers' stocks in ground storage.
[3] Includes Alaska and Hawaii.
[4] American Gas Association.

LABOR AND PRODUCTIVITY

Employment.—The Bureau of Mines publishes two sets of employment figures for bituminous coal mines. One set (presented in the next chapter of this volume) is unadjusted for lack of coverage, but is directly comparable to the reported injuries and is used for calculating injury rates. These data are adjusted for coverage, and the resulting adjusted figures are published in the chapter on bituminous coal and used for the productivity analyses. Employment figures for the anthracite industry represent full coverage for both productivity and injury analyses and are virtually identical. The U.S. Department of Labor, Bureau of Labor Statistics, publishes a third set of employment data, based upon payroll information. The Bureau of Employment Security of the U.S. Department of Labor publishes still another series based on reports to state agencies under unemployment security laws. Bureau of Labor Statistics data are presented in table 12 to facilitate comparison with Bureau of Mines figures. Table 11 indicates the order of difference between the Bureau of Labor Statistics information on total employment, the Bureau of Mines fully adjusted data, and the figures of the Bureau of Employment Security. Generally the series move in the same direction, but they have differed markedly on several occasions.

The information presented in table 12 permits comparison between the various segments of the fuel mining and manufacturing industries. Employment in the bituminous coal industry began the year at a level higher than the 1959 average but with demand not fulfilling expectations, employment declined throughout the year, and average employment for the year was 5.5 percent below the 1959 average. The long-term decline in employment in anthracite continued. Employment in crude petroleum and natural gas declined in the face of production increases, as the industry, in the face of a declining growth rate, attempted to reduce costs. Employment was steady in petroleum and coal product manufacturing.

The decrease in employment in bituminous coal (average of men working daily) occurred in spite of the increase in the number of days worked to 191 as compared with 188 in 1959. The anthracite industry showed an increase to 176 in days worked as compared with 173 in 1959.

Productivity.—The productivity of labor continued to increase in bituminous coal mining and also rose in anthracite mining. The net tons per man per day reached 12.83 in bituminous coal mining (an alltime high) and was 5.60 in anthracite mining (also an alltime record) as compared with 12.22 and 5.12, respectively, in 1959 and 6.77 and 2.83 in 1950.

Hours and Earnings.—Average hourly earnings, average weekly hours, and average weekly earnings remained steady for all segments of the mineral-fuels industry.

Labor-Turnover Rates.—The data presented in table 14 are sensitive indicators of the state of business. The mild recession during 1959 is clearly reflected in both the accession and separation rates.

TABLE 11.—Comparison of data on total employment in the mineral-fuel industries

(In thousands)

	Petroleum		Bituminous coal			Anthracite		
	BLS data [1]	BES data [2]	BLS data [1]	BES data [2]	Mines data [3]	BLS data [1]	BES data [2]	Mines data [3]
1956	324.8	314.0	228.6	229.0	228.2	29.3	29.7	31.5
1957	326.2	315.7	230.0	227.2	228.6	28.4	28.9	30.8
1958	302.6	313.2	195.2	192.7	197.4	20.3	23.3	26.5
1959	300.8	313.6	168.1	171.6	179.6	16.3	18.8	23.3
1960	288.0	299.6	158.9	163.2	169.4	12.4	14.9	19.1

[1] Bureau of Labor Statistics, Monthly Labor Review.
[2] Bureau of Employment Security, Employment and Wages.
[3] Minerals Yearbook, average men working daily.

TABLE 12.—Total employment in the mineral-fuel industries[1]

(Thousands)

	Mining					Manufacturing		
	Total	Anthracite	Bituminous coal	Crude petroleum and natural gas production	Crude petroleum and natural gas production (except contract services)[2]	Total products of petroleum and coal	Petroleum refining	Coke, other petroleum and coal products
1951–55 (average)	634.7	51.6	287.2	295.9	(3)	254.6	202.3	52.3
1956	582.7	29.3	228.6	324.8	192.3	252.1	200.8	51.3
1957	584.6	28.4	230.0	326.2	193.8	249.5	199.1	50.4
1958	518.1	20.3	195.2	302.6	188.0	238.2	192.1	46.1
1959	485.2	16.3	168.1	300.8	180.6	233.4	186.2	47.2
1960:								
January	480.1	15.5	173.2	291.4	177.7	231.9	183.8	48.1
February	476.4	15.5	173.2	287.7	175.9	232.4	184.1	48.3
March	470.2	14.1	171.5	284.6	174.3	232.2	183.8	48.4
April	469.2	13.2	168.7	287.3	174.8	232.4	183.7	48.7
May	465.6	12.2	167.2	286.2	174.2	231.9	183.2	48.7
June	467.6	11.8	164.2	291.6	177.0	232.5	184.0	48.5
July	442.8	10.7	140.5	291.6	178.4	230.2	183.4	46.8
August	458.5	11.3	155.6	291.6	177.8	229.8	182.4	47.4
September	452.1	11.8	151.4	288.9	176.2	226.2	180.3	45.9
October	446.7	11.9	150.0	284.8	172.4	224.8	178.7	46.1
November	442.6	10.9	147.0	284.7	171.9	221.6	177.5	44.1
December	440.9	9.8	144.9	286.2	171.5	218.2	176.7	41.5
Average, 1960	459.3	12.4	158.9	288.0	175.2	228.7	181.8	46.9

[1] Monthly Labor Review, Bureau of Labor Statistics, U.S. Dept. of Labor; data are for all employees, those for production and nonsupervisory workers are also available in this publication.
[2] Not included in total because data are also included with crude petroleum and natural gas production.
[3] Data not available.

TABLE 13.—Average hours and gross earnings of production and nonsupervisory workers in the mineral fuels and related industries [1]

	Mining											
	Total fuels [2]			Anthracite			Bituminous coal			Petroleum and natural gas production except contract services		
	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings
1951-55 (average)	$83.98	36.1	$2.32	$71.92	30.9	$2.33	$83.66	34.8	$2.40	$88.44	40.8	$2.17
1956	102.61	38.6	2.66	78.96	32.9	2.40	106.22	37.8	2.81	101.68	41.0	2.48
1957	107.11	37.7	2.85	81.79	31.1	2.63	110.53	36.6	3.02	106.75	40.9	2.61
1958	103.51	36.1	2.87	76.01	28.9	2.63	102.38	33.9	3.02	109.75	40.8	2.69
1959	115.67	37.9	3.07	84.98	30.9	2.75	118.30	36.4	3.25	114.93	40.9	2.81
1960:												
January	120.53	39.5	3.06	88.09	31.8	2.77	127.32	38.7	3.29	116.72	41.1	2.84
February	115.25	38.1	3.02	76.16	27.2	2.80	121.97	37.3	3.27	112.12	39.9	2.81
March	119.54	39.5	3.03	99.91	36.2	2.76	127.26	38.8	3.28	113.52	40.4	2.81
April	117.28	38.7	3.04	80.88	29.2	2.77	122.30	37.4	3.27	115.18	40.7	2.83
May	116.27	38.4	3.04	82.29	29.6	2.78	119.03	36.4	3.27	116.03	41.0	2.83
June	116.66	38.7	3.03	93.23	33.9	2.75	121.69	37.1	3.28	113.52	40.4	2.81
July	117.75	39.1	3.02	93.50	34.0	2.75	121.60	37.3	3.26	116.16	40.9	2.84
August	112.59	37.7	3.00	94.26	34.4	2.74	114.10	35.0	3.26	112.44	40.3	2.79
September	111.65	37.2	3.02	84.39	30.8	2.74	108.23	33.2	3.26	116.44	41.0	2.84
October	113.18	37.6	3.03	95.22	34.5	2.76	111.51	34.1	3.27	115.87	40.8	2.84
November	109.66	36.6	3.01	94.46	34.6	2.73	104.33	32.1	3.25	115.18	40.7	2.83
December	111.49	37.1	3.02	95.35	34.8	2.74	109.54	33.6	3.26	114.05	40.3	2.83
Average, 1960	115.24	38.8	2.97	88.83	32.3	2.75	117.77	36.0	3.27	114.49	40.6	2.82

See footnotes at end of table.

TABLE 13.—Average hours and gross earnings of production and nonsupervisory workers in the mineral fuels and related industries[1]—Continued

	Manufacturing								
	Total: Products of petroleum and coal			Petroleum refining			Coke, other petroleum, and coal products		
	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings
1951-55 (average)	$89.12	40.8	$2.18	$92.78	40.6	$2.29	$77.84	41.8	$1.86
1956	104.39	41.1	2.54	108.39	40.9	2.65	91.32	41.7	2.19
1957	108.39	40.9	2.65	112.88	40.9	2.76	96.00	41.2	2.33
1958	110.97	40.5	2.74	114.90	40.6	2.83	97.28	40.2	2.42
1959	117.38	40.9	2.87	121.29	40.7	2.98	105.83	41.5	2.55
1960:									
January	116.98	40.2	2.91	120.40	40.0	3.01	106.90	40.8	2.62
February	116.87	40.3	2.90	120.60	40.2	3.00	105.97	40.6	2.61
March	116.87	40.3	2.90	120.20	40.2	2.99	106.49	40.8	2.61
April	119.54	40.8	2.93	124.23	41.0	3.03	105.44	40.4	2.61
May	118.03	40.7	2.90	123.11	40.9	3.01	102.51	40.2	2.55
June	119.60	41.1	2.91	123.22	40.8	3.02	108.36	42.0	2.58
July	121.18	41.5	2.92	124.84	41.2	3.03	109.82	42.4	2.59
August	117.62	40.7	2.89	120.90	40.3	3.00	107.43	41.8	2.57
September	120.60	41.3	2.92	124.53	41.1	3.03	108.52	41.9	2.59
October	117.62	40.7	2.89	121.80	40.6	3.00	104.70	40.9	2.56
November	117.97	40.4	2.92	122.91	40.7	3.02	102.31	39.5	2.59
December	119.07	40.5	2.94	123.32	40.7	3.03	102.96	39.6	2.60
Average, 1960	118.44	40.7	2.91	122.51	40.7	3.01	105.93	40.9	2.59

[1] Monthly Labor Review, Bureau of Labor Statistics, U.S. Dept. of Labor.
[2] Weighted average using employment as weights, computed by authors.

TABLE 14.—Labor turnover rates, mineral fuels and related industries [1]

(Per thousand employees)

Rates, year, and month	All manufacturing	Products of petroleum and coal	Petroleum refining [2]	Anthracite mining	Bituminous-coal mining
Total accession rate:					
1959 average	36	10	5	16	23
1960:					
January	36	6	4	18	17
February	29	6	4	7	13
March	27	8	4	10	9
April	28	7	5	11	12
May	32	12	8	10	10
June	39	18	16	18	9
July	29	8	6	15	10
August	38	11	6	24	27
September	38	9	7	15	12
October	28	7	7	15	10
November	23	5	5	14	12
December	19	4	4	36	10
Average, 1960	30	8	6	16	13
Total separation rate:					
1959 average	34	11	8	29	36
1960:					
January	29	10	9	22	15
February	30	7	6	13	13
March	37	9	8	11	19
April	36	11	8	32	38
May	33	9	8	31	40
June	33	11	8	38	31
July	36	16	15	77	100
August	43	14	14	18	33
September	44	26	21	29	18
October	38	23	16	81	19
November	39	15	8	31	20
December	41	18	10	57	50
Average, 1960	37	14	11	37	33
Layoff rate:					
1959 average	16	4	2	17	31
1960:					
January	13	5	4	8	9
February	15	2	1	6	8
March	22	3	2	2	14
April	20	5	2	18	31
May	16	3	3	16	35
June	17	4	2	19	26
July	20	8	5	61	87
August	22	5	5	6	26
September	20	9	6	13	10
October	22	13	6	73	13
November	27	9	2	24	14
December	30	11	3	45	44
Average, 1960	20	6	3	24	26

[1] Monthly Labor Review, Bureau of Labor Statistics, U.S. Dept. of Labor.
[2] Office of Employment Statistics, Bureau of Labor Statistics, U.S. Dept. of Labor.

PRICES AND COSTS

Mine Value.—An index of average unit mine value for the United States is presented in the fuels volume of the Minerals Yearbook for the first time in table 15. The same index was published initially in the Review of Mineral Industries chapter of the Minerals Yearbook, 1959, volume I, but showed no detail in the fuels area. It is believed this index serves a unique purpose, not rendered by other mineral price series. The mine value index attempts to give the value of the mineral before processing. Other mineral price series indicate the cost including value added in refining. It is believed that this index gives a much clearer indication of the return to the actual producer of the mineral than other series.

From 1928 until 1952 both coal and petroleum and natural gas showed similar movements. The prices of both showed similar downward movement during the depressed 1930's, rebounding in the post-World War II inflation. The mine value of coal doubled between 1928 and 1947. Crude petroleum and natural gas had doubled in value between 1928 and 1948. The index of both fuels remained practically constant until 1952. Since then the indexes have diverged. The coal index has decreased by almost 7 percent. The crude/natural gas index between 1952 and 1960 divides into two phases with 1957 as the turning point. Value increased 22 percent between 1952 and 1957. Prices have been subjected to downward pressure since the Suez crisis, reflecting a worldwide crude surplus.

Prices.—The average wholesale price index at 119.6 in 1960 was virtually unchanged from 1959. The index for gas was the only fuels index showing a sizable increase in 1960. In two years the increase has been 14.5 percent.

Costs.—An index of major input expenses in anthracite, bituminous coal, and crude petroleum production has been constructed by the Office of Chief Economist, Bureau of Mines. This index does not compare the actual costs of producing these fuels but only indicates the changes in operating costs for each since 1947. The labor input has been adjusted for productivity changes using the data in table 18. The weights are based upon the 1954 Census of Mineral Industries. The categories of expense considered are labor, supplies, fuels, and purchased electric energy. These indexes do not include capital costs. A comparable index for metal mining is presented in the Review of the Mineral Industries chapter, volume 1, Minerals Yearbook.

Labor costs are the largest factor in the determination of the index of major input expenses, ranging from 50 percent in petroleum to 75 percent in anthracite. The decreasing costs in anthracite and bituminous coal have occurred in a period of increasing wage rates, 85 percent in bituminous coal since 1950. However, the increased wages have been more than offset by productivity advances, thus reducing unit labor costs. This has not been the case in petroleum and natural gas. Although wage rates have risen less than the rates in bituminous coal, unit labor costs have increased as productivity advances have not kept pace with wage increases.

TABLE 15.—Index of average unit mine value of minerals produced in the United States, by group and subgroup

(1947-49=100)

Year	All minerals	Metals total	Non-metals total	Fuels		
				Total	Coal	Crude oil and natural gas
1925	61	61	73	59	48	77
1926	64	59	77	63	50	85
1927	55	55	75	52	48	60
1928	53	56	76	49	45	55
1929	54	63	77	50	44	58
1930	51	53	74	48	42	55
1931	40	45	74	36	39	32
1932	40	39	71	37	33	40
1933	38	46	73	33	33	33
1934	47	56	72	43	40	46
1935	47	57	70	42	40	44
1936	49	60	70	45	40	49
1937	52	67	71	48	43	52
1938	51	61	71	47	43	50
1939	48	64	68	43	41	46
1940	48	64	67	44	43	45
1941	53	67	70	49	48	50
1942	56	69	75	52	52	52
1943	60	74	79	55	59	53
1944	62	75	83	58	64	54
1945	63	76	84	59	67	54
1946	70	84	89	66	75	61
1947	87	95	97	85	89	83
1948	107	103	101	109	106	110
1949	105	103	102	106	105	107
1950	105	109	104	105	105	105
1951	109	128	109	107	107	107
1952	110	132	111	107	107	108
1953	115	137	116	112	108	115
1954	115	140	117	111	98	119
1955	116	156	119	111	97	119
1956	120	171	122	114	103	120
1957	127	157	124	123	109	132
1958	123	150	124	120	105	129
1959	122	158	126	118	102	126
1960	121	162	127	116	100	125

Relative Labor Cost.—The most important element in operating costs is wages and salaries. The index of relative labor costs adjusts average earnings by changes in productivity to indicate the direction of movement in real labor costs per ton of coal and barrel of oil. When the changes in value of a ton of coal or barrel of oil are considered, an index of labor costs per dollar of product is obtained. The changes in labor costs per ton and per dollar have been irregular but down in the coal industries since 1949 and reached a low point in 1960. In the same period the labor costs in petroleum have increased.

Fuel Costs, Electricity Generation.—Table 20 shows the fuel cost in cents per million B.t.u. of electric power generated for the major mineral fuels by regions of the United States. This table serves as an index of the price of the various fuels to a major consuming industry.

TABLE 16.—Average monthly wholesale price indexes for selected fuels[1]

(1947-49=100)
(Unless otherwise specified)

	Fuels total	Coal	Coke	Gas [2]	Electricity [2]	Petroleum and products
1951-55 (average)	107.8	108.2	129.7	106.5	99.1	111.2
1956	111.2	114.5	149.7	115.1	94.2	118.2
1957	117.2	124.4	161.7	116.1	95.5	127.0
1958	112.7	122.9	161.9	101.7	100.4	117.7
1959	112.7	122.6	169.8	110.9	100.8	116.6
1960:						
January	111.9	124.1	170.4	116.6	101.3	114.4
February	112.0	124.1	170.4	114.5	101.8	114.6
March	112.3	124.0	170.4	115.6	101.8	115.0
April	112.2	119.0	170.4	115.6	101.8	115.4
May	110.8	118.7	170.4	111.6	101.7	113.6
June	112.3	119.5	170.4	112.2	101.8	116.0
July	113.8	120.3	170.4	114.4	102.0	117.9
August	115.3	121.3	170.4	116.6	102.1	120.0
September	116.1	122.4	170.4	121.3	102.1	120.7
October	116.2	122.5	170.4	120.9	102.1	121.0
November	116.1	123.0	170.4	120.2	102.4	120.6
December	116.2	123.1	170.4	120.0	102.3	120.8
Average, 1960	113.8	121.8	170.4	116.6	101.9	117.5

[1] U.S. Dept. of Labor, Bureau of Labor Statistics, Monthly Labor Review.
[2] Gas and electricity beginning January 1958, January 1958=100.

TABLE 17.—Comparative fuel prices

Fuel	1959	1960
Bituminous coal:		
Average prices:		
Railroad fuel, f.o.b. mine [1] dollars/net ton	[2] 5.61	5.53
Average retail price [3] do	16.89	17.06
Cost of coal at merchant coke ovens do	10.49	10.54
Anthracite, average sales realization per net ton on shipments to points outside regions, excluding dredge coal:		
Chestnut dollars	11.41	10.72
Pea do	9.42	8.85
Buckwheat No. 1 do	8.73	8.09
Petroleum and petroleum products:		
Crude petroleum, average price per barrel at well do	2.90	2.88
Gasoline, average dealers' net price (excluding taxes) of gasoline in 55 U.S. cities [4] cents/gallon	16.09	16.08
Residual fuel oil:		
No. 6 fuel oil, average of high and low prices in Philadelphia [4] dollars/barrel (refinery)	2.68	2.90
Bunker C, average price for all Gulf ports [4] do	2.05	2.20
Distillate, fuel oil:		
No. 2 distillate, average of high and low prices at Philadelphia [4] cents/gallon (refinery)	9.86	9.29
No. 2 distillate, average price for all Gulf ports [4] do	9.24	8.61
Natural gas:		
Average U.S. value, at well cents/thousand cubic feet	12.9	14.0
Average U.S. value, at points of consumption do	47.7	50.1
Average wholesale price index for all commodities [3]	119.5	[5] 119.6

[1] Interstate Commerce Commission.
[2] Revised figure.
[3] Bureau of Labor Statistics, U.S. Department of Labor published and unpublished.
[4] Platt's Oil Price Handbook.
[5] Preliminary.

TABLE 18.—Indexes of major input expenses adjusted for productivity, mineral-fuel mining

(1950=100)

	Anthracite	Bituminous coal	Crude petroleum and natural gas
1950	100	100	100
1951	107	106	104
1952	106	104	108
1953	107	104	109
1954	91	94	115
1955	90	93	116
1956	88	97	121
1957	96	102	127
1958	93	98	134
1959	86	[1] 98	132
1960	81	95	131

[1] Revised.

TABLE 19.—Indexes of relative labor cost, mineral-fuel mining

(1950=100)

	Index of labor costs per unit of output [1]			Index of value of product per man-period [2]			Index of labor costs per dollar of product [3]		
	Anthracite	Bituminous	Petroleum	Anthracite	Bituminous	Petroleum	Anthracite	Bituminous	Petroleum
1950	100	100	100	100	100	100	100	100	100
1951	106	106	97	112	106	112	100	104	97
1952	106	103	108	111	112	108	103	102	108
1953	107	102	113	122	123	115	101	101	106
1954	86	88	120	133	131	115	91	94	109
1955	85	88	118	120	135	120	100	94	108
1956	81	92	124	134	151	122	91	92	113
1957	90	96	132	144	164	135	93	92	108
1958	87	90	146	154	168	122	87	90	122
1959	77	[4] 90	140	170	[4] 178	128	82	[4] 91	122
1960	71	86	139	173	184	131	81	89	121

[1] Anthracite and bituminous indexes based upon net tons per man per day (from chapters on Coal, Minerals Yearbook, 1960, vol. II), and index of average earnings derived from Bureau of Labor Statistics data on hourly earnings; petroleum index based upon barrels per year (from chapter on Petroleum, Minerals Yearbook, 1960, vol. II) and Bureau of Employment Security data on total wages in petroleum production.

[2] Anthracite and bituminous indexes based upon net tons per man per day and mine values of production; petroleum index based upon average employment and total value of production.

[3] Anthracite and bituminous indexes based upon index of value per man-day and index of average earnings; petroleum index based upon total value of production and total wages.

[4] Revised.

TABLE 20.—Cost of fuel in electric-power generation [1]

(Cents per million B.t.u.)

Region	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas
	1960			1959			1958		
New England	36.5	36.0	35.6	37.7	35.8	34.5	40.1	40.7	37.8
Middle Atlantic	30.0	35.1	35.7	30.8	35.5	33.0	32.3	38.5	32.0
East North Central	25.3	65.5	[2]25.3	25.6	73.2	[2]24.5	25.8	68.5	24.6
West North Central	27.0	43.4	23.0	27.5	46.7	22.4	28.1	51.3	22.0
South Atlantic	26.3	35.6	31.8	27.2	35.5	29.7	28.6	39.7	27.6
East South Central	19.6	50.3	24.8	19.1	47.1	23.4	19.4	37.6	21.6
West South Central	32.3	45.1	16.7	15.8	43.2	15.0	15.6	41.8	12.9
Mountain	20.2	25.0	27.8	21.3	24.3	25.7	21.9	25.2	22.2
Pacific	------	32.3	33.4	------	34.8	32.0	------	42.0	26.5
Average, United States	26.0	34.5	23.8	26.5	35.2	22.3	27.4	39.6	19.5
	1957			1956			1955		
New England	41.0	46.9	40.7	38.8	41.4	37.9	35.4	36.6	36.0
Middle Atlantic	31.9	45.9	32.1	30.0	40.2	31.9	28.4	35.7	30.8
East North Central	25.8	68.2	23.1	24.6	74.3	21.7	23.9	69.1	22.2
West North Central	28.2	47.6	22.2	26.9	43.4	22.1	26.5	31.0	22.6
South Atlantic	29.0	46.2	25.8	28.1	39.5	25.2	25.9	36.0	25.3
East South Central	19.4	46.1	21.6	18.7	42.4	19.8	18.3	43.8	18.3
West South Central	14.9	41.7	12.9	15.2	40.4	12.4	20.5	40.0	11.4
Mountain	22.0	25.1	22.2	22.0	26.0	22.0	21.7	24.9	21.6
Pacific	------	41.5	26.5	------	33.0	25.0	------	27.8	23.8
Average, United States	27.5	44.4	19.5	26.2	37.9	18.5	25.2	33.2	18.0

[1] Steam-Electric Plant Factors 1955 through 1960, National Coal Association.
[2] Excludes blast-furnace gas, which would lower cost slightly.

INCOME AND INVESTMENT

National Income Originated.—The rate of growth of income originating in mining was again lower in 1960 than the rate for all industries. But the gap between the rates of increase was greatly lessened. For all industries the rate halved, dropping from almost 9 percent to less than 4.5 percent. The rate for mining increased somewhat, chiefly because of the dramatic reversal in metal mining between 1959 and 1960. The income originating in the manufacture of coal and petroleum products showed no change from 1959. Mining and the manufacture of petroleum products account for less than 2.5 percent of total national income.

Investment.—Data on total investment in fuels are not available. Table 22 presents data on direct private investments abroad in the petroleum industry. The only information available on book values of domestic investments is that contained in the statistical summary of balance-sheet data from corporate-income tax returns. These reports are issued after a delay of 2 years. Data are not yet available for 1959. As compared with a total book value of $9.7 billion in foreign investments at the end of 1958 for petroleum industries, the total book value of crude petroleum and products (including coal products) was $45 billion. (To indicate the growth in domestic investment, the figure for fiscal 1952 was $28.9 billion.)

Indicated current rates of investment are given by figures on expenditures for new plants and equipment in the mining and manufacturing industries and by data on gross proceeds of new corporate security offerings. Expenditures for new plant and equipment recovered somewhat from the low point of 1958 in both mining and manufacturing.

TABLE 21.—National income by industrial origin, selected industries[1]

Industry	1959 (millions)	Change from 1958 (percent)	1960 (millions)	Change from 1959 (percent)
All industries	$399,551	+8.76	$417,054	+4.38
Mining	5,466	+.57	5,516	+.91
Metal mining	664	−12.28	869	+30.87
Anthracite mining	107	−26.71	92	−14.02
Bituminous and and other soft coal mining	1,188	−2.70	1,160	−2.36
Crude petroleum and natural gas	2,694	+5.19	2,562	−4.90
Nonmetallic mining and quarrying	813	+8.40	833	+2.46
Manufacturing	119,569	+15.17	121,544	+1.65
Products of petroleum and coal	4,195	+14.21	4,199	+.10

[1] U.S. Department of Commerce, Survey of Current Business, July 1961, table 8.

TABLE 22.—Direct private investment of United States companies in foreign petroleum industries, 1960[1 2]

(Million dollars; net inflows to the United States (−))

Country	Petroleum				All industries			
	Book value beginning of year	Net capital movements	Undistributed earnings of subsidiaries	Book value end of year	Book value beginning of year	Net capital movements	Undistributed earnings of subsidiaries	Book value end of year
Canada	2,467	138	46	2,667	10,310	471	389	11,198
Latin American Republics:								
Brazil	84	−9	(3)	76	828	83	39	953
Central America and West Indies	245	23	6	274	1,758	12	55	1,825
Colombia	225	7	1	233	401	15	8	424
Mexico	30	1	1	32	758	56	−3	795
Venezuela	2,046	−60	12	1,995	2,690	−150	59	2,569
Total[4]	2,858	−7	33	2,882	8,098	95	215	8,365
Dependencies in Western Hemisphere	346	31	6	382	768	54	63	884
Western Europe	1,452	273	1	1,726	5,323	962	326	6,645
Africa	334	62	13	407	833	81	50	925
Middle East	1,175	−76	20	1,119	1,213	−72	21	1,163
Far East	492	20	25	536	1,024	52	67	1,152
Oceania	355	2	15	372	879	41	74	994
International enterprises[5]	841	12	−2	851	1,357	12	49	1,418
Grand total	10,320	455	157	10,944	29,805	1,694	1,254	32,744

[1] U.S. Dept. of Commerce, Survey of Current Business, August 1961.
[2] Other adjustments to yearend book values, in millions of dollars, are as follows, for petroleum and all industries, respectively: Canada 17, 28; Latin American Republics −3, −43; Brazil 0, 2; Mexico 0, −16; Venezuela −3, −30; Western Europe 0, 34; Africa −2, −38; Far East 0, 10; grand total 12, −9.
[3] Less than $500,000.
[4] Includes countries not shown above.
[5] Includes shipping enterprises registered in Liberia and Panama but operating worldwide.

TABLE 23.—Expenditures on new plant and equipment by firms in mining and selected mineral manufacturing industries[1]

(Billion dollars)

Industry	1958	1959	1960	1960 January-March	1960 April-June	1960 July-September	1960 October-December
Mining[2]	0.94	0.99	0.99	0.22	0.27	0.25	0.24
Manufacturing:							
Primary iron and steel	1.19	1.04	1.60	.33	.42	.42	.43
Primary nonferrous metals	.44	.31	.31	.07	.08	.07	.09
Stone, clay, and glass products	.40	.53	.62	.14	.17	.15	.16
Chemicals and allied products	1.32	1.23	1.60	.33	.40	.40	.46
Petroleum and coal products	2.43	2.49	2.64	.53	.69	.63	.78
Total, manufacturing	11.43	12.07	14.48	3.09	3.76	3.62	4.01

[1] U.S. Dept. of Commerce, Survey of Current Business, March 1961.
[2] Including fuels.

TRANSPORTATION

As indicated in table 25, the methods of shipping bituminous coal and lignite from the mines have changed significantly within recent years; shipments by rail have declined, whereas shipments by water and truck have increased. Generally, the cost by water or truck, particularly for short distances, is less than the rail freight rate. Transportation costs comprise a significant portion of the delivered price of coal, thus placing it at a competitive disadvantage with oil and natural gas, which are moved by tankers and pipelines. About 73 percent of all coal moves by rail, and freight adds as much as 70 percent to the mine price of coal. As a consequence, considerable attention is being given to means of substantially reducing transportation costs. Among these are locating large coal-consuming industries at or near coal sources (particularly near water transportation), increased barging and trucking of coal, and transmitting electric energy directly from mine-located generating plants.

The total movement of mineral fuels and related products by rail and water is summarized in tables 26 and 27.

TABLE 24.—Estimated gross proceeds of new corporate securities offered for cash in the United States in 1960[1]

Type of security	Total corporate Value (millions)	Total corporate Percent	Manufacturing Value (millions)	Manufacturing Percent	Mining[2] Value (millions)	Mining[2] Percent
Bonds	$8,122	80	$1,577	72	$170	68
Preferred stock	393	4	41	2	1	(3)
Common stock	1,644	16	581	26	78	31
Total	10,159	100	2,199	100	249	100

[1] U.S. Securities and Exchange Commission, Statistical Bulletin, Vol. 20, No. 3, March 1961, p. 8. Substantially all new issues of securities offered for cash sale in the United States in amounts over $100,000 and with terms to maturity of more than 1 year are covered in these data.
[2] Including fuels.
[3] Less than .5 percent.

TABLE 25.—Method of shipment of bituminous coal and lignite from mines, and used at mines, in the United States

	Method of shipment from mines: Shipped by rail and trucked to rail	Method of shipment from mines: Shipped by water and trucked to water	Method of shipment from mines: Trucked to final destination	Used at mines[1]	Total production
	Thousand net tons				
1956	390,015	50,732	49,768	10,359	500,874
1957	380,471	51,171	50,334	10,728	492,704
1958	305,642	43,899	50,605	10,300	410,446
1959	300,763	45,954	52,564	12,747	412,028
1960	303,865	46,784	52,699	12,164	415,512
	Percentage of total				
1956	77.9	10.1	9.9	2.1	100.0
1957	77.2	10.4	10.2	2.2	100.0
1958	74.5	10.7	12.3	2.5	100.0
1959	73.0	11.1	12.8	3.1	100.0
1960	73.1	11.3	12.7	2.9	100.0

[1] Includes coal used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, transported from mines to point of use by conveyors or trams, made into beehive coke at mines and all other uses at mines.

Table 28 shows the costs of transporting coal by rail in the United States and an index of dry cargo and tanker rates in international trade. Domestic rail costs for anthracite have been rising slowly since 1954. Bituminous coal rates followed a similar upward course until 1959, and have since declined to a rate somewhat lower than the 1956 rate. Transportation costs in international trade fluctuate more and show the effects of international crises. International tanker rates were substantially down in 1960, continuing a trend started in 1958.

TABLE 26.—Rail transportation of mineral fuels and related products in the United States, by products[1]

(Thousand short tons)

Product	1957	1958	1959	1960	Change from 1959 (percent)
Coal:					
Anthracite[2]	30,285	23,770	20,358	16,840	−17
Bituminous	372,194	307,492	307,226	304,500	−1
Coke	19,564	12,635	16,155	16,453	+2
Crude petroleum	2,046	1,196	1,531	1,888	+23
Gasoline	8,853	8,366	8,172	7,531	−8
Distillate and residual fuel oil	9,553	8,475	8,066	7,279	−10
Asphalt	3,495	3,356	2,944	2,734	−7
Other[3]	15,543	14,777	15,816	16,013	+1
Total	461,533	380,067	380,268	373,238	−2

[1] Revenue freight originated, excluding forwarder and less than carload shipments, for which categories commodity detail is not available. Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Steam Railways in United States, for years ended Dec. 31, 1959 and 1960.
[2] Includes shipments to washeries and breakers.
[3] Lubricants, petroleum products, and gases.

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TABLE 27.—Water transportation of mineral fuels and related products in the United States, by products[1]

(Thousand short tons)

Product	1957	1958	1959	Change from 1958 (percent)
Coal:				
Anthracite	1,261	865	814	−6
Bituminous	151,161	126,688	130,038	+3
Coke	480	279	285	+2
Crude petroleum	74,090	67,888	72,356	+7
Gasoline	90,640	92,226	93,021	+1
Distillate fuel oil	69,125	72,541	73,192	+1
Residual fuel oil	43,940	42,432	45,265	+7
Asphalt	3,329	3,611	4,118	+14
Kerosine	8,918	9,346	9,325	0
Other[2]	9,776	10,626	12,146	+14
Total	452,720	426,502	440,560	+3

[1] Domestic Traffic; that is, traffic with Canal Zone, the Virgin Islands, and military cargoes carried in Defense Department vehicles are excluded. Source: Department of the Army, Waterborne Commerce of the United States, Calendar year 1958, pt. 5, National Summaries.
[2] Includes lubricants, jet fuel, napthene, and briquets.

DISTRIBUTION OF BITUMINOUS COAL AND LIGNITE

Tables 29, 30, and 31 summarize the distribution of bituminous coal and lignite in 1960 from coal-producing districts of origin to States of destination, by methods of transportation and types of consumer use. This information shows the participation of the bituminous coal and lignite industry in the various energy markets of the Nation, both locally and nationally. It also provides benchmarks for special studies and analyses of the many factors that influence coal production and its utilization in the highly competitive energy market.

The information is based upon reports submitted voluntarily to the Bureau of Mines by producers, sales agents, distributors, and wholesalers who normally produce or sell 100,000 tons or more annually. The unprecedented cooperation of these respondents resulted in their reporting about 94 percent of all coal produced or shipped during the

TABLE 28.—Freight costs in domestic and international trade

	Domestic,[1] average revenue per ton (dollars)		Foreign[2] (1953=100)	
	Anthracite (n.o.s.)	Bituminous coal	Dry cargo time charter	Tanker
1953	3.35	3.33	100	100
1954	3.31	3.23	118	80
1955	3.33	3.24	214	83
1956	3.39	3.45	285	103
1957	3.52	3.57	198	109
1958	3.68	3.58	92	92
1959	3.65	3.45	92	82
1960	3.70	3.40	108	74

[1] Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Freight Commodity Statistics.
[2] United Nations, Monthly Bulletin of Statistics, June 1961.

year. To account for total industry shipments, estimates for the remaining shipments are included, based on data from coal trade and other reliable coal statistical reporting agencies.

Details of the distribution survey are shown in Bureau of Mines Mineral Market Report 3204.

TABLE 29.—Distribution of bituminous coal and lignite, 1960, by method of movement and consumer use

(Thousand net tons)

Shipments	Consumer use: Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
Total shipments to all destinations in the United States, Canada, and Mexico by all methods of movement and consumer use and overseas exports	174,287	86,092	32,167	92,812	2,250	1,676
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Methods of movement:						
All-rail	79,128	40,858	21,597	58,774		
River and ex-river	41,940	24,198	1,097	5,951		
Great Lakes [1]	15,016	13,802	4,169	12,199		
Tidewater [2]	14,011	6,014	449	1,718		
Truck	13,524	[3] 1,220	4,855	[3] 14,170		
Tramway, conveyor, and private railroad	10,668	(3)		(3)		
Methods of movement and/or consumer uses unknown					2,250	1,676
Total	174,287	86,092	32,167	92,812	2,250	1,676

Shipments	Canadian Great Lakes commercial docks [3]	U.S. Great Lakes dock storage [4]	U.S. Tidewater dock storage [4]	Overseas exports [5]	Net change in mine inventory	Total
Total shipments to all destinations in the United States, Canada, and Mexico by all methods of movement and consumer use, and overseas exports	1,715	363		24,818	−61	416,119
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Methods of movement:						
All-rail						200,357
River and ex-river						73,186
Great Lakes [1]						45,186
Tidewater [2]						22,192
Truck						[6] 33,769
Tramway, conveyor, and private railroad						[6] 10,668
Methods of movement and/or consumer uses unknown	1,715	363		24,818	−61	30,761
Total	1,715	363		24,818	−61	416,119

[1] Excludes shipments to Canadian Great Lakes commercial docks and U.S. dock storage for which consumer uses are not available; however, includes vessel fuel, the destinations of which are not available.
[2] Excludes overseas exports and U.S. tidewater dock storage for which consumer uses are not available; however, includes bunker fuel, the destinations of which are not available
[3] Shipments via tramway, conveyor, and private railroad are included with truck shipments.
[4] Consumer use unknown.
[5] Excludes Canada; consumer use unknown.
[6] Shipments via tramway, conveyor, and private railroad to coke and gas plants and all other uses are included with truck shipments.

TABLE 30.—Distribution of bituminous coal and lignite, 1960, by district of origin and consumer use

(Thousand net tons)

District of origin [1]	Consumer use					
	Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
1	15,832	3,577	977	8,564	244	293
2	7,359	21,789	733	6,625	29	119
3 and 6	22,247	7,279	1,109	8,298	166	29
4	20,377	5	1,968	10,917	388	67
7	1,978	14,971	3,820	3,434	78	184
8	33,427	26,234	11,911	25,283	347	785
9	22,318	9	2,814	5,007	95	1
10	26,416	637	4,701	13,899	437	55
11	9,678	---	1,001	4,793	159	39
12	631	---	53	387	---	---
13	6,498	6,542	363	1,180	4	27
14	2	854	12	122	---	---
15 [2]	2,760	162	328	1,117	78	---
16	548	---	114	208	---	8
17	659	1,600	334	325	3	7
18	34	---	29	109	---	10
19	1,052	---	209	578	161	10
20	505	2,433	1,042	878	9	19
21	1,365	---	521	589	41	16
22 and 23	604	---	128	499	11	7
Total	174,289	86,092	32,167	92,812	2,250	1,676

District of origin [1]	Canadian Great Lakes commercial docks [3]	U.S. Great Lakes dock storage [3]	U.S. Tidewater dock storage [3]	Overseas exports [4]	Net change in mine inventory	Total
1	106	2	−3	1,081	33	30,706
2	164	3	---	---	−172	36,649
3 and 6	344	27	1	544	22	40,066
4	104	89	---	---	−34	33,881
7	7	57	---	10,556	−68	35,017
8	990	194	2	12,499	112	111,784
9	---	−13	---	---	104	30,335
10	---	1	---	---	−49	46,097
11	---	3	---	---	3	15,676
12	---	---	---	---	---	1,071
13	---	---	---	91	−18	14,687
14	---	---	---	---	---	990
15 [2]	---	---	---	---	6	4,451
16	---	---	---	---	---	878
17	---	---	---	---	2	2,930
18	---	---	---	---	---	182
19	---	---	---	---	---	2,010
20	---	---	---	47	−2	4,931
21	---	---	---	---	−4	2,528
22 and 23	---	---	---	---	4	1,250
Total	1,715	363	---	24,818	−61	416,119

[1] Producing districts are defined in Mineral Market Report 3204, March 1961.
[2] Excludes Texas.
[3] Consumer use unknown.
[4] Excludes Canada; consumer use unknown.

TABLE 31.—Distribution of bituminous coal and lignite, 1960, by destination and consumer use

(Thousand net tons)

Destination	Consumer use				
	Total	Electric utilities	Coke and gas plants	Retail dealers	All others
New England:					
Massachusetts	4.031	2,420	107	417	1,087
Connecticut	3,758	2,829	462	86	381
Maine, New Hampshire, Vermont, and Rhode Island	1,524	751	1	120	652
Middle Atlantic:					
New York	22,980	11,531	4,302	431	6,716
New Jersey	5,910	3,635	746	67	1,462
Pennsylvania	47,283	15,444	21,856	1,283	8,700
East North Central:					
Ohio	49,624	21,375	11,880	3,471	12,898
Indiana	32,283	13,723	11,024	2,180	5,356
Illinois	38.705	19,134	2,948	6,570	10,053
Michigan	25,076	10,191	4,517	2,458	7,910
Wisconsin	12,437	5,149	340	2,829	4,119
West North Central:					
Minnesota	6,375	2,948	731	974	1,722
Iowa	4,946	2,060		939	1,947
Missouri	7,279	3,598	214	1,223	2,244
North Dakota and South Dakota	2,453	1,256		700	497
Nebraska and Kansas	1,518	679		289	550
South Atlantic:					
Delaware and Maryland	9.031	3,762	4,148	231	890
District of Columbia	1,002	427		138	437
Virginia	11,685	6,131	168	1,326	4,060
West Virginia	13,778	5,964	4,125	251	3,438
North Carolina	8,667	5,354		1,027	2,286
South Carolina	3,591	1,648		345	1,598
Georgia and Florida	4,793	3,881		395	517
East South Central:					
Kentucky	11,270	7,274	1,475	699	1,822
Tennessee	14,786	11,773	190	977	1,846
Alabama and Mississippi	15,500	7,487	6,726	283	1,004
West South Central: Arkansas, Louisiana, Oklahoma, and Texas	1,114		707	71	336
Mountain:					
Colorado	2,887	1,217	855	265	550
Utah	3,377	505	2,195	257	420
Montana and Idaho	952	189		519	244
Wyoming	1,006	835		59	112
New Mexico	171	29		43	99
Arizona and Nevada	143	5		24	114
Pacific:					
Washington and Oregon	953			351	602
California	1,318		1,286	7	25
Alaska	720	412		66	242
Canada	9,572	174	4,715	697	3,986
Mexico	57				57
Destinations not revealable	1,380	497	374	99	410
Destination and consumer uses not available:					
Great Lakes movement:					
Canadian commercial docks	1,715				
Vessel fuel	1,419				
U.S. dock storage	363				
Tidewater movement:					
Overseas exports (except Canada)	24,818				
Bunker fuel	4				
U.S. dock storage					
Railroad fuel:					
U.S. companies	2,124				
Canadian companies	126				
Coal used at mines and sales to employees	1,676				
Net change in mine inventory	−61				
Total	416,119				

GOVERNMENT ACTIVITIES

Office of Coal Research.—On July 7, 1960, a law establishing the Office of Coal Research within the Department of the Interior was signed by the President. The purpose of the Office is to encourage applied research in coal utilization. The Office, either acting independently or in cooperation with interested public and private groups, will award and supervise contracts in short-term research. It is felt this type of research will quickly assist the coal industry in improving its economic position. The law authorizes the appointment of an advisory committee composed of private experts who will assist the Government in the selection of projects. One million dollars was appropriated for fiscal 1961. No contracts were awarded during calendar 1960.

Oil-Import Program.—As a result of increased imports of crude petroleum and products in late 1958 and early 1959 under the Voluntary Oil-Import Program, the President, upon a finding that such imports threatened to impair the national security, issued Proclamation 3279 on March 10, 1959, which established a mandatory program for adjusting imports of petroleum and petroleum products into the United States. The latter program (1) established a maximum level of imports in Districts I–IV of crude oil, unfinished oils, and finished products, except residual fuel oil, at 9 percent of total demand, (2) limited imports of residual fuel oil into Districts I–IV to the 1957 level, and (3) limited imports of crude oil, unfinished oils, and finished products into District V to an amount that, when added to domestic production and supply, would approximate total demand. No changes in the program were made during 1960.

Mine-Water Control.—At yearend there were 19 projects operating under the Federal-State Mine-Water Control Program established in 1955 by the Federal Government and the Commonwealth of Pennsylvania. Six projects were completed and placed in operation during the year and three projects were terminated. Two new projects were authorized by the Secretary of the Interior in 1960.

WORLD REVIEW

U.S. trade in mineral fuels remained unchanged in 1960. Both imports and exports dropped slightly, but the net import balance remained stable, with imports exceeding exports by 82 percent in value. This compares with the 1959 import balance of 80 percent. The dramatic change in the U.S. mineral-fuels trade balance occurred in 1958, the first year that the value of imports exceeded the value of exports. In 1957 imports were 85 percent of exports. In 1958 imports were 151 percent of exports.

The explanation of this shift is found in the export area, imports being unchanged at $1.5 billion in both 1957 and 1960. Exports declined more than 50 percent between 1957 and 1960 from $1.8 billion to $0.8 billion. Three commodities accounted for 85 percent of this change; coal, crude oil, and fuel oils. Coal exports, which have dropped $475 million, account for almost half of the loss of import receipts from mineral fuels.

TABLE 32.—Value of imports and exports, mineral fuels and products [1]

(Thousand dollars)

SITC No.	Group and commodity	Imports for consumption [2]			Exports of domestic merchandise		
		1958	1959	1960	1958	1959	1960
311-01	Coal: Anthracite, bituminous, subbituminous, lignite	2,581	2,455	1,860	525,643	378,204	353,929
311-02	Coke: Coal and lignite	1,571	1,441	1,483	7,127	8,674	6,831
311-03	Briquets: Coal, lignite, coke, and peat	2	3	390	899	495	305
	Total: Coal and related products	4,154	3,899	3,733	533,669	387,373	361,065
312-01	Petroleum, crude and partly refined for further refining	995,990	940,543	957,822	20,156	13,829	16,663
313-01	Motor spirit (gasoline and other light oils for similar uses), including gasoline blending agents	111,070	64,644	10,847	142,045	108,757	82,578
313-02	Lamp oil and white spirit (kerosine, illuminating oil)	148	536	224	6,063	5,632	3,673
313-03	Gas, diesel, and other fuel oils	498,851	505,220	513,537	117,464	91,838	78,780
313-04	Lubricating oils and greases, including mixtures with animal and vegetable lubricants	112	35	348	193,261	189,051	212,752
313-05	Mineral jelly and waxes, including petrolatum	1,347	2,055	1,682	25,945	28,564	32,627
313-09	Pitch, resin, petroleum asphalt, coke of petroleum and other byproducts of coal, lignite, petroleum and oil shale, including mixtures with asphalt, n.e.s., not chemicals	19,784	19,553	16,611	31,321	30,949	40,311
314-01	Gas, natural	21,821	26,329	28,372	14,655	6,263	3,630
314-02	Gas, manufactured	------	------	------	8,423	6,791	9,646
	Total: Petroleum and related products	1,649,123	1,558,915	1,529,443	559,333	481,674	480,660
	Total fuels	1,653,277	1,562,814	1,533,176	1,093,002	869,047	841,725
	Total nonfuels (includes scrap but excludes wrought metals)	1,572,731	1,863,497	1,840,134	541,807	561,667	1,078,481
	Total minerals	3,226,008	3,426,311	3,373 310	1,634,809	1,430,714	1,920,206

[1] Grouping of commodities based upon Standard International Trade Classification of United Nations. Basic data compiled by Office of Chief Economist, Bureau of Mines, from supplement to Annual Statistical Bulletin, Series IV, by Organization for European Economic Cooperation, which represents conversion of U.S. import and export classification to SITC categories. Actual import and export data from U.S. Dept. of Commerce reports FT-110 and FT-410. Since SITC may differ from that used by Bureau of Mines, values shown may not compare with those in commodity chapters.

[2] Includes items entered for immediate consumption, withdrawn from bonded storage warehouses for consumption, and withdrawn from bonded smelting and refining warehouses for consumption or export.

Source: U.S. Department of Commerce.

World Production.—World coal production (anthracite, bituminous, and lignite) in 1960 was estimated at 2,632 million metric tons (2,204.6 pounds per ton) of which slightly more than 24 percent or about 643 million tons consisted of lignite. This is an increase of approximately 113 million tons when compared to the 1959 output. Both lignite and the combination of anthracite and bituminous coal shared in the increased output, the former by about 23 million tons and the latter by 90 million tons. All the continental areas of the world, with the exception of South America, reported increases in production during the year.

The U.S.S.R. continues to lead the world in total coal production, with an output of 373 million tons of anthracite and bituminous coal and 140 million tons of lignite. The Soviet Union's lignite production declined by more than 1.3 million tons compared with 1959 and

TABLE 33.—Comparison of world and U.S. production of principal fuels

Mineral	1959			1960		
	World, thousand short tons	United States		World, thousand short tons	United States	
		Thousand short tons	Percentage of world production		Thousand short tons	Percentage of world production
Coal:						
Bituminous	1,906,658	409,248	21	2,003,135	412,766	21
Lignite	682,946	2,780	(1)	708,330	2,746	(1)
Pennsylvania anthracite	187,100	20,649	11	189,500	18,817	10
Coke (excluding breeze):						
Gashouse [2]	50,670	(3)	(3)	51,300	(3)	(3)
Oven and beehive	289,689	55,864	19	306,720	57,229	19
Fuel briquets and packaged fuel	114,600	900	(1)	118,300	769	(1)
Natural gas (marketable) million cubic feet	(4)	12,046,115	(4)	(4)	(4)	(4)
Peat	76,700	419	(1)	75,700	471	(1)
Petroleum (crude) thousand barrels	7,133,663	2,574,590	36	7,683,752	2,574,933	34

[1] Less than 1 percent.
[2] Includes low- and medium-temperature, and gashouse coke.
[3] Bureau of Mines not at liberty to publish U.S. figure separately.
[4] Data not available.

Compiled by Augusta W. Jann, Division of Foreign Activities.

3.1 million tons compared with 1958. The increase of nearly 8 million and 20 million tons, in the production of anthracite and bituminous coal, compared with 1959 and 1958 respectively, more than compensates for the shortfall in lignite output.

Europe's (including the U.S.S.R.) overall coal and lignite production increased about 22 million tons in 1960 compared with 1959. About 1 million tons of this was anthracite and bituminous coal, and the remainder (about 21 million tons) consisted of lignite. The European countries in the Soviet bloc increased their output of anthracite and bituminous coal by about 14.5 million tons, whereas the western-oriented countries experienced a downward trend in their production, amounting to about 13.5 million. The single European country showing the greatest decline was the United Kingdom, where the output of anthracite and bituminous coal was almost 13 million tons under the 1959 level.

Australia increased production of anthracite and bituminous coal by more than 2 million tons and of lignite by approximately the same amount. In Africa, the Union of South Africa, reporting an output of marketable anthracite and bituminous coal of some 38.2 million tons, compared with approximately 36.5 million in 1959, was the only country showing any important changes during the period.

The most significant gains in coal production were recorded in Asia. Reported production for Communist China, of all types of coal, was 420 million metric tons for the year. This represents an increase of more than 72 million tons over the reported 1959 production. India increased her output by about 5 million tons, while Japan's production was almost 4 million tons higher than 1959. The Republic of Korea reported increases of more than 1 million tons in anthracite production, as did North Vietnam. In total, Asia's output of coal in 1960 was about 83.5 million tons higher than 1959.

Finally, North American coal production showed a net increase of 2 million tons in 1960 when compared with 1959. Almost all of this increase is reflected in the U.S. coal industry, which expanded its output of bituminous coal by 3.5 million tons, but this was counterbalanced in part by a decline of about 1.8 million tons in anthracite production.

U.S. Exports.—In the calendar year of 1960, the United States exported 37.9 million short tons (2,000 pounds per ton) of bituminous coal and anthracite compared with 39.0 million tons in 1959. The decline of 1.1 million tons, or nearly 3 percent, reflects the continuing lower demand for both anthracite and bituminous coal by the Canadian and European markets, and an increase in requirements for U.S. bituminous coal in Japan and South America. Shipments of bituminous coal to Canada were off by 774 thousand tons and anthracite by 324 thousand. In Europe, the countries of the European Coal and

TABLE 34.—Monthly average of production of mineral fuels and products in selected OEEC countries [1]

(Million metric tons)

Product	Member countries combined	Austria	Belgium	France	Saar	West Germany
Black coal:						
1953	40.20	(2)	2.51	4.38	1.37	10.37
1954	40.60	(2)	2.44	4.53	1.40	10.67
1955	40.70	(2)	2.50	4.61	1.44	10.89
1956	41.10	(2)	2.46	4.59	1.42	11.20
1957	41.20	(2)	2.42	4.73	1.37	11.10
1958	40.50	(2)	2.26	4.81	1.36	11.05
1959	38.60	(2)	1.90	4.80	1.34	10.47
1960	37.50	(2)	1.87	4.66	11.86	
Coking coal:						
1953	6.74	0.13	.50	.74	.31	3.15
1954	6.65	.14	.51	.79	.31	2.92
1955	7.42	.15	.55	.92	.34	3.39
1956	8.07	.17	.61	1.04	.35	3.63
1957	8.37	.18	.60	1.07	.37	3.78
1958	7.98	---------	.58	1.06	.36	3.63
1959	7.54	---------	.60	1.12	.36	3.21
1960	7.99	---------	.63	1.14	3.73	
Crude petroleum:						
1953	.54	.25	---------	.03	---------	.18
1954	.63	.28	---------	.04	---------	.22
1955	.76	.31	---------	.07	---------	.26
1956	.85	.29	---------	.11	---------	.29
1957	.97	.27	---------	.12	---------	.33
1958	1.01	.24	---------	.12	---------	.37
1959	1.08	.21	---------	.14	---------	.43
1960	1.19	.20	---------	.16	---------	.46
Petroleum products: [5]						
1953	19.39	[6] .26	.75	5.21	---------	1.49
1954	22.32	[6] .32	.88	5.46	---------	1.97
1955	23.91	.51	1.10	5.74	---------	2.31
1956	25.88	.49	1.28	6.17	---------	2.59
1957	25.74	.50	1.27	5.70	---------	2.69
1958	31.04	.44	1.56	6.84	---------	3.47
1959	32.69	.45	(3)	6.98	---------	4.96
1960	(3)	(3)	(3)	(3)	(3)	(3)
Natural gas: [7]						
1953	257	[8] 40	---------	20	---------	5
1954	328	[8] 45	---------	22	---------	12
1955	407	62	---------	23	---------	20
1956	493	62	---------	28	---------	31
1957	555	63	---------	46	---------	30
1958	617	68	---------	88	---------	29
1959	854	94	---------	218	---------	32
1960	1,066	123	---------	370	---------	37

See footnotes at end of table.

TABLE 34.—Monthly average of production of mineral fuels and products in selected OEEC countries—Continued

(Million metric tons)

Product	Italy	Netherlands	Turkey	United Kingdom	Other member countries
Black coal:					
1953	0.09	1.03	0.31	18.98	0.13
1954	.09	1.01	.31	18.97	.12
1955	.10	.99	.29	18.76	.12
1956	.09	.99	.31	18.80	.12
1957	.09	.95	.33	18.93	.13
1958	.06	.99	.34	18.27	.13
1959	.06	1.00	.33	17.45	.12
1960	.06	1.04	.30	16.46	.12
Coking coal:					
1953	.20	.27	(3)	1.48	.09
1954	.22	.28	(3)	1.52	.10
1955	.25	.33	(3)	1.53	.12
1956	.28	.35	(3)	1.66	.13
1957	.31	.35	(3)	1.73	.16
1958	.28	.34	(3)	1.56	.17
1959	.27	.34	(3)	1.44	----------
1960	.31	.38	(3)	1.60	----------
Crude petroleum:					
1953	.01	.07	(4)	----------	----------
1954	.01	.08	.01	----------	----------
1955	.02	.09	.02	----------	----------
1956	.05	.09	.03	----------	----------
1957	.11	.13	.03	----------	----------
1958	.13	.14	.03	----------	----------
1959	.14	.15	.03	----------	----------
1960	.17	.16	.03	----------	----------
Petroleum products: [5]					
1953	2.99	2.16	----------	6.09	.44
1954	3.76	2.60	----------	6.68	.65
1955	4.02	2.97	.02	6.52	.72
1956	4.43	3.36	.07	6.76	.73
1957	4.79	3.52	.07	6.39	.81
1958	5.63	3.62	.08	7.56	1.84
1959	6.17	3.75	.09	8.97	1.32
1960	(3)	(3)	(3)	(3)	(3)
Natural gas: [7]					
1953	192	----------	----------	----------	----------
1954	249	----------	----------	----------	----------
1955	302	----------	----------	----------	----------
1956	372	----------	----------	----------	----------
1957	416	----------	----------	----------	----------
1958	432	----------	----------	----------	----------
1959	510	----------	----------	----------	----------
1960	536	----------	----------	----------	----------

[1] General Statistics, OEEC Statistical Bulletins, May 1961, No. 3.
[2] Included in other countries.
[3] Not available.
[4] Less than 0.005 million metric tons.
[5] Production data for petroleum products reflect quarterly rather than monthly averages.
[6] Refined for Austrian account.
[7] Million cubic meters.
[8] Producers' shipments.

Steel Community purchased 1.13 million tons less of bituminous coal and some 17,000 tons less of anthracite, whereas total European imports from the United States declined 2.21 million tons.

Japan and the South American countries of Argentina, Brazil, and Chile increased their receipts of U.S. coal during 1960. Japan's imports from the United States consisted entirely of bituminous coal (primarily for the steel industry) amounting to 5.62 million tons, exceeding the 1959 receipts by 1.6 million tons. Japan was the only Asiatic market for U.S. coal of any consequence during 1960.

In South America, Argentina, Brazil, and Chile increased their imports of U.S. coal by 664 thousand tons, almost all of which was bituminous. The combined total imports of these countries from the United States for the year were approximately 2.2 million tons, of which Argentina took 681 thousand, Brazil 1.1 million, and Chile 369 thousand tons. Uruguay accounted for the remaining 80 thousand tons.

The continued decline in the European requirements for U.S. coal reflects the changing pattern of primary energy sources on the continent. The transition from coal to oil, gas, and electricity continues unabated, and increased efficiency in the use of coke in metallurgy tends to decrease the relative proportion that coal plays in supplying total energy requirements.

In Japan and South America, the rapid expansion of the iron and steel industries has created a demand for coal of coking quality, which under present conditions of availability of supply and cost of the delivered product, can best be supplied from U.S. sources.

Mineral fuels production in the OEEC countries, except for natural gas, remained virtually unchanged in 1960. Natural gas output was up 25 percent, with increased French production accounting for 70 percent of the growth. Natural gas production in the OEEC countries is about 3.5 percent of U.S. production. A time series showing production of several fuels is given in table 34.

World Trade Prices.—Crude oil prices continue to tend downward, reacting to a world market dominated by excess capacity and supply. The pressure is more intense on the crude oil competing in international markets than on the crude oil supplying protected markets. Petroleum product prices showed a mixed trend, whereas coal prices except for Germany were steady to lower.

TABLE 35.—World-trade price indexes[1]

(1953=100)

Mineral	1960	1959	1958	1957	1956	1955	1954
Crude petroleum:							
Kuwait	100.0	103.0	112.8	109.8	104.9	104.9	104.9
Saudi Arabia	102.8	106.1	114.9	113.3	106.6	106.6	106.6
United Kingdom	80.8	85.4	94.2	108.2	98.8	86.9	85.4
United States:							
West-Texas Sour	109.0	[2] 109.4	114.2	114.2	104.3	104.3	104.3
Refugio-Light	109.8	109.8	113.2	118.2	104.7	104.7	104.7
Saudi Arabian	89.8	95.3	104.4	115.5	107.3	96.2	94.7
Venezuelan	97.8	100.0	108.2	110.1	101.6	101.3	101.3
Venezuela:							
Export price f.o.b. Puerta La Cruz	101.4	102.9	110.5	110.1	101.4	104.0	104.3
Export price f.o.b. Amuay	102.2	104.0	113.3	112.9	102.2	102.2	102.2
Petroleum products:							
United Kingdom	119.9	116.4	114.7	135.0	111.1	101.3	99.5
U.S. distillate No. 2	101.2	107.4	104.9	118.5	109.9	106.2	102.5
U.S. gasoline	90.4	88.6	88.6	95.6	91.2	92.1	90.4
Coal:							
Canada	110.7	110.7	110.7	109.1	104.1	97.5	97.5
Germany	121.5	117.7	117.7	112.1	105.6	99.4	97.9
United Kingdom	82.7	90.9	112.7	140.0	129.1	99.1	96.4
United States	107.3	108.6	112.3	115.6	105.6	94.2	93.8

[1] United Nations, Monthly Bulletin of Statistics, July 1961, table 47.
[2] Revised figure.

Employment and Injuries in the Fuel Industries

By John C. Machisak

Contents

INTRODUCTION

THIS CHAPTER of the Minerals Yearbook contains injury experience and related employment information for the coal-mining, coking, oil and gas, and peat industries of the United States for 1960. Injury experience is measured by the number of injuries per million man-hours of exposure to the hazards of the particular industry.

No attempt has been made to combine these data and present rates reflecting an overall experience for the fuels section of the mineral industries. This is because the various hazards of the four industries are not comparable. Analytical tabulations regarding the trend of the injuries and employment for all mineral industries are shown separately in combined form for ready comparison in volume III of the Minerals Yearbook.

COAL

The frequency rate of disabling work injuries in the coal-mining industry of the United States showed a 6-percent increase over the record low rate established in 1959. Final data for the anthracite industry and preliminary information for the bituminous coal and lignite industry indicated a combined fatal and nonfatal frequency rate of 44.76 per million man-hours of exposure in 1960.

Although the number of fatal injuries (326) reported by the industry increased 11 percent over the preceding year, it was the second lowest recorded. One major disaster (a disaster is a single accident resulting in the death of five men or more) occurred in 1960 in which 18 men died of asphyxiation following a mine fire in a bituminous coal mine.

Nonfatal injuries at all coal mines declined 3 percent from the preceding year, but the frequency of occurrence increased 6 percent.

In 1960, 178,151 production and development employees accumulated 272 million man-hours of worktime, a decrease of 8 and 12 percent, respectively, from 1959. Employees worked an average of 7.88 hours a day for 194 days during the year.

Bituminous coal mines.—The combined fatal and nonfatal injury-frequency rate for the Nation's bituminous coal and lignite industry was less favorable in 1960 than in 1959. Preliminary information for 1960 indicated increases of 18 percent in the number of deaths reported and 8 percent in the combined fatal and nonfatal frequency rate.

Of the 291 fatalities reported by the bituminous coal and lignite industry, 246 occurred underground, 23 at surface operations, 19 at stripping operations, and 3 at auger mines. The leading cause of fatal injuries in the industry was roof falls, including those of face and rib. In 1960, these causes claimed the lives of 146 men, 11 more than in 1959. Haulage accidents ranked second as the cause of fatal injuries and resulted in the loss of 34 lives underground in 1960—2 less than in 1959.

The average number of men working daily in the bituminous coal industry continued to decline. In 1960, it was 12 percent lower than the average employment in 1959 and was the lowest number of men working since 1910, when records were first compiled by the Bureau. Employees worked an average of 7.94 hours a day for 196 days during the year, an increase of 9 days over the number of days worked in 1959. Total man-hours worked decreased 7 percent in 1960, resulting in an average workyear of 1,556 hours per man.

Anthracite mines.—The injury rate per million man-hours (fatal and nonfatal) at Pennsylvania anthracite mines decreased 3 percent in 1960. The number of fatalities and the frequency rate of their occurrence decreased 26 and 11 percent, respectively, from the previous year. Nonfatal injuries in 1960 were lower in both number and frequency rate—19 and 2 percent, respectively.

Accidents at anthracite mines in 1960 caused the deaths of 35 men—12 fewer than in 1959. Of the 35 deaths chargeable to the anthracite industry, 28 occurred underground at deep mines, 2 at breakers, 1 at culm banks, and 4 at stripping operations. Eighteen of these underground fatal injuries were caused by falls of roof, face, or rib. Four fatalities resulted from haulage injuries—50 percent less than in 1959.

The average number of men working daily and total man-hours decreased 18 and 17 percent, respectively, from 1959. Average days of employment per man increased to 176 in 1960—3 days more per man than in 1959; the average workday remained the same (7.28 hours). In 1960, a workyear of 1,284 hours was recorded—23 more hours of work per man than in 1959.

TABLE 1.—Employment and injury experience at coal mines in the United States, 1956–60 [1]

Industry and year	Average men working daily [2]	Average active mine days [3]	Man-days worked (thousand)	Man-hours worked (thousand)	Number of injuries		Injury rate per million man-hours
					Fatal	Nonfatal	
Bituminous coal mines: [4]							
1956	227,778	212	48,392	383,442	392	16,486	44.02
1957	223,900	206	46,020	363,896	427	15,915	44.91
1958	198,350	183	36,260	286,758	326	12,036	43.11
1959	180,303	187	33,738	266,660	246	10,440	40.07
1960 [5]	159,100	196	31,171	247,590	291	10,450	43.38
Anthracite mines:							
1956	32,507	212	6,893	50,220	56	3,330	67.42
1957	30,825	196	6,057	44,311	51	2,877	66.08
1958	26,540	183	4,861	35,471	32	2,124	60.78
1959	23,294	173	4,036	29,371	47	1,723	60.26
1960	19,051	176	3,360	24,452	35	1,401	58.73
Total coal mines:							
1956	260,285	212	55,286	433,662	448	19,816	46.73
1957	254,725	204	52,077	408,207	478	18,792	47.21
1958	224,890	183	41,121	322,229	358	14,160	45.05
1959	203,597	186	37,773	296,031	293	12,163	42.08
1960 [5]	178,151	194	34,531	272,042	326	11,851	44.76

[1] Man-days and man-hours of employment have been rounded to the nearest thousand and will not necessarily add to published total

[2] Average number of men at work each day mine was active. Because absenteeism and labor turnover were taken into consideration, this number is lower than number of men available for work, as measured by a count of names on payroll.

[3] Average in which operating time of each mine is weighted by average number of workers in mines.

[4] Includes lignite.

[5] Bituminous data for 1960 are preliminary.

COKE

The overall injury-frequency rate of the coking industry in 1960 showed some improvement over that of the preceding year. While the number of fatal injuries remained the same and nonfatal injuries increased by one in 1960, a 6-percent increase in total man-hours is primarily responsible for a decline of 5 percent in the combined rate of occurrence of disabling injuries. The number of operating ovens decreased 7 percent from 1959, however, employment remained virtually the same with only 1-percent drop in 1960. The average hours worked per employee increased 7 percent and averaged an 8-hour shift, with 22 more work days per man than in 1959.

Slot-type ovens.—The 3 fatalities reported in the coke industry occurred at slot-type ovens as did 79 percent of all nonfatal injuries but, at the same time, nonfatal injuries at slot-type ovens declined to a record low in 1960. The combined frequency rate of fatal and nonfatal injuries at these ovens indicated a 9-percent decrease from 1959 for each million hours that employees were on the job. Man-hours of worktime were up 6 percent, although average employment remained virtually the same, with employees working 23 more days in 1960 and averaging 2,874 hours each for the year. The customary 8-hour shift was maintained and there was no work stoppage during the year.

Beehive-coke ovens.—Eight consecutive years have passed without a fatality in the beehive segment of the coke industry, but nonfatal injuries increased 18 percent over 1959 and resulted in the highest frequency rate of occurrence (64.57) on record. Employment declined 12 percent and man-days and man-hours, each, were 16 percent lower than in the previous year. Shifts were 7½ hours in length, with employees working 6 days less than in 1959, while the average work hours declined 4 percent.

TABLE 2.—Employment and injury experience at coke ovens in the United States, 1956–60 [1]

Industry and year	Average men working daily [2]	Average active plant days [3]	Man-days worked (thousand) [4]	Man-hours worked (thousand) [4]	Number of injuries		Injury rate per million man-hours
					Fatal	Nonfatal	
Slot-type coke ovens:							
1956	19,318	355	6,854	54,857	10	268	5.07
1957	19,203	364	6,989	55,859	12	197	3.74
1958	15,654	359	5,616	44,970	5	190	4.34
1959	15,865	337	5,354	42,782	3	183	4.35
1960	15,779	360	5,673	45,353	3	177	3.97
Beehive-coke ovens:							
1956	1,155	197	228	1,700	----------	33	19.41
1957	1,061	186	198	1,478	----------	47	31.80
1958	532	125	67	516	----------	20	38.76
1959	780	145	113	844	----------	39	46.20
1960	684	139	95	712	----------	46	64.57
All coke ovens:							
1956	20,473	346	7,082	56,557	10	301	5.50
1957	20,264	355	7,187	57,337	12	244	4.46
1958	16,186	351	5,683	45,486	5	210	4.73
1959	16,645	328	5,467	43,626	3	222	5.16
1960	16,463	350	5,768	46,066	3	223	4.91

[1] All data are final.
[2] Average number of men at work each day oven was active. Because absenteeism and labor turnover are taken into consideration, this number is lower than the number of men available for work, as measured by a count of names on payroll.
[3] Average in which operating time of each plant is weighted by average number of workers in the plant.
[4] Man-days and man-hours of employment have been rounded to the nearest thousand and will not necessarily add to published totals.

OIL AND GAS

A 14-percent decrease in the number of injuries in the oil and gas industry was accompanied by a 10-percent drop in work hours in 1960, while occurrence of injuries (fatal and nonfatal) per million man-hours of exposure fell 4 percent below that of 1959. Injuries occurred less frequently than at any time on record and, at the same time, were 19 percent less severe than in the previous year. The lowest severity rate, prior to this time, was 938 in 1958, but this rate was improved 13 percent in 1960.

The nonfatal injuries consisted of 309 permanent partial and 8,801 temporary total injuries, with an average time-loss charge of 41 days. However, when fatalities and permanent total injuries were included with the first two categories, the time-loss charge increased to 94 days in 1960. This was an improvement of 18 days over 1959.

Although the improvement in injury occurrence was general, none was noted in five segments of the industry, as follows: Production, natural gasoline, marine transportation (inland waters), refining, and miscellaneous. Severity of injuries in 1960 was less in all but three fields of activity—pipeline oil, marine transportation (inland waters), and miscellaneous. Improvements over 1959 occurred in both frequency and severity rates of injuries in exploration, drilling, pipeline gas, marine transportation (ocean and coastwise), marketing, and reasearch and engineering.

Employment was lower than at any time since 1948, dropping 9 percent, while man-hours of worktime were lower than at any time since 1947, decreasing 10 percent from 1959. Employees averaged 2,080 hours each, averaging 39 hours less worktime in 1960.

TABLE 3.—Employment and injury experience in the oil and gas industry of the United States, 1956–60

Year	Average men working daily	Man-hours worked (thousand)	Number of injuries		Injury rate per million man-hours
			Fatal [1]	Nonfatal	
1956	585, 486	1, 235. 555	147	11, 372	9. 32
1957	617, 596	1, 293, 725	121	11, 426	8. 93
1958	584, 708	1, 215, 722	116	11. 588	9. 63
1959	559, 244	1. 185, 146	120	10, 543	9. 00
1960	511, 107	1, 063, 332	82	9, 110	8. 64

[1] Fatal and permanent total injuries combined.

PEAT

The injury-frequency rate for extracting and processing peat was 27.72 disabling work injuries per million man-hours of exposure. Nonfatal injuries in 1960 were higher in both number and frequency rate—71 and 46 percent, respectively. Reports were received from 115 active operations—an increase of 21 (22 percent) over the preceding year. Twenty-one States reported production in 1960 compared with 19 in 1959.

An average of 576 employees worked 1,503 hours each during the year, accumulating a total of 0.9 million man-hours. Increases of 23 and 17 percent, respectively, in the number of men employed and total man-hours were noted, while the average hours worked per employee declined 5 percent compared with 1959.

TABLE 4.—Employment and injury experience in the peat industry in the United States, 1957–60

Year	Average men working daily	Man-hours worked (thousand)	Number of injuries		Injury rate per million man-hours
			Fatal	Nonfatal	
1957 [1]	139	231		5	21. 68
1958	464	704		12	17. 05
1959	467	738	1	14	20. 33
1960	576	866		24	27. 72

[1] Incomplete return—first year of canvass.

CONCLUSION

The safety record of the oil and gas industry was the best of any year since the Bureau of Mines has collected data on employment and injuries in the industry. The frequency rate of occurrence of injuries in the coking industry showed improvement over the preceding year, while coal mines and peat extracting and processing operations suffered a decline in safety performance when compared with 1959. There was a general downward trend in employment in the Nation's fuel industries during 1960.

PART II. COMMODITY REVIEWS

A. Coal and Related Products

Coal—Bituminous and Lignite

By W. H. Young,[1] R. L. Anderson,[2] and E. M. Hall[3]

Contents

GENERAL SUMMARY

THE BITUMINOUS coal and lignite industry improved slightly in 1960, compared with 1959. Although mechanization continued to expand and production and consumption increased slightly, average value, exports, and employment decreased. The percentage of underground production mechanically loaded, the percentage of total production mined by stripping, and tonnage per man per day were at their highest levels.

Production.—The output of bituminous coal and lignite in the United States in 1960—416 million tons—was 0.8 percent greater than the 412 million tons produced in 1959. Production was retarded in 1960, owing largely to the business recession and reduced exports.

The major seasonal fluctuation in production, as in the past, resulted from the miners' vacation period of 12 days in midsummer. According to the Bureau of Labor Statistics, U.S. Department of Labor, time lost because of strikes totaled 137,000 man-days in 1960 compared with 1,560,000 in 1959.

Trend of Employment.—Employment decreased 6 percent.

Index to Capacity.—As it is impossible for all mines to operate every working day in the year, an estimate of 280 days for calculating potential capacity was suggested some years ago by the coal committee of the American Institute of Mining, Metallurgical and Petroleum Engineers. The average output per day worked in 1960

[1] Chief, Section of Bituminous Coal and Lignite.
[2] Supervisory commodity industry analyst.
[3] Supervisory statistical assistant.

was 2.2 million tons, which, if applied to 280 days, gives an annual potential output of 609 million tons, compared with the actual production of 416 million tons. This is not a measure of practical productive capacity of the industry because railroad coal car availabilities and other factors bearing on the ability of the industry to produce are not reflected in this computation.

Mechanization.—Coal output that was loaded mechanically at underground mines in the United States—86 percent—was the same as in 1959.

Mechanical Cleaning.—Approximately 66 percent of the bituminous coal and lignite mined in the United States in 1960 was mechanically cleaned. The growth of mechanical cleaning has closely paralleled that of mechanical mining, partly because more refuse is loaded with the coal. Moreover, the bituminous coal and lignite industry has attempted to meet the consumer demand for cleaner coal. A large part of the remaining 34 percent was handpicked and screened into various sizes at tipples with no mechanical cleaning facilities.

Consumption.—Consumption of bituminous coal and lignite in the United States increased 4 percent. The principal increase was registered by the electric-power utilities; railroads and cement mills showed decreases. Retail deliveries remained steady.

Trends of Fuel Efficiency.—As in many other years, electric-power utilities scored new records in fuel efficiency.

Competition With Oil and Gas.—Although consumption of energy has increased steadily since 1920, the proportion supplied by bituminous coal and lignite has decreased consistently as a result of serious competition from oil and gas. Of total energy consumed in 1960, bituminous coal and lignite furnished 22 percent; anthracite, 1 percent; oil, 43 percent; gas, 30 percent; and waterpower, 4 percent.

Electric utilities consumed 5 percent more bituminous coal, 6 percent more gas, and 3 percent less fuel oil in 1960.

Class I railroads decreased their consumption of coal 19 percent and their purchases of fuel oil and diesel fuel 1 percent.

Stocks.—The reserve supply of bituminous coal and lignite in the hands of industrial consumers and retail coalyards decreased from 76 million tons at the beginning of the year to 73 million tons at the end of the year. Stocks increased from a 64- to a 65-day supply. Stocks on the upper lake docks increased 201,639 tons from January 1 to December 31, 1960.

Exports.—Exports totaled 36 million tons, decreasing 2 percent from 1959; 25 million tons was shipped overseas and 11 million tons, to Canada.

SCOPE OF REPORT

These data include all coal produced in the United States except Pennsylvania anthracite, Texas lignite, and bituminous coal and lignite mines that produce under 1,000 tons per year.

Throughout the chapter all tonnage figures show net tons of marketable coal and exclude washery and other refuse. "Tons" refers to net short tons of 2,000 pounds.

Statistics for 1960 are final and are based upon detailed annual reports of production and mine operation furnished by producers. All but a small percentage of the output was covered by the reports submitted. For production not directly reported (chiefly that of small mines), accurate data were obtained from the records of the various State mine departments (which have statutory authority to require such reports) or in a few instances, from railroad carloadings. Thus, complete coverage of all mines producing 1,000 tons a year or more is reported. Inclusion of many small mines that produce less than 1,000 tons a year was not attempted.

From 1955 to 1960 the annual production form did not request information on employment. These figures for men working daily, days worked, man-days worked, and tons per man per day were obtained from the Accident Analysis Branch of the Bureau of Mines.

Statistical procedures are also detailed in the following sections: Production by Months and Weeks, Number and Size of Mines, Mechanical Cleaning, Production by States and Counties, Consumption, and Stocks.

TABLE 1.—Salient characteristics of the bituminous coal and lignite industry in the United States

Item	1959	1960	Change from 1959 (percent)
Production .... net tons	412,027,502	415,512,347	+0.8
Consumption .... do	366,256,000	380,429,000	+3.9
Stocks at end of year:			
Industrial consumers and retail yards .... do	76,202,000	73,244,000	−3.9
Stocks on upper lake docks .... do	3,452,678	3,654,317	+5.8
Imports and exports: [1]			
Imports .... do	374,713	260,495	−30.5
Exports .... do	37,226,766	36,491,424	−2.0
Price indicators (average per net tons):			
Average cost of railroad fuel purchased, f.o.b. mines [2]	$5.63	$5.51	−2.1
Average cost of coking coal at merchant coke ovens	$10.49	$10.55	+.6
Average retail price [3]	$16.89	$17.06	+1.0
Average railroad freight charge per net ton [2]	$3.45	$3.40	−1.4
Average value f.o.b. mines	$4.77	$4.69	−1.7
Equipment sold:			
Mobile loading machines	95	110	+15.8
Continuous mining machines	140	128	−8.6
Augers	47	25	−46.8
Shuttle cars	233	219	−6.0
Conveyors:			
Gathering and haulage	118	92	−22.0
Room or transfer	65	47	−27.7
Method of mining:			
Hand loaded underground .... net tons	39,702,471	39,102,535	−1.5
Mechanically loaded underground .... do	243,731,184	245,785,775	+.8
Percentage of total underground production mechanically loaded	86.0	86.3	+.3
Mined by stripping .... net tons	120,953,334	122,629,664	+1.4
Mined at auger mines .... do	7,640,513	7,994,373	+4.6
Mechanically cleaned .... do	269,786,687	273,168,694	+1.3
Number of mines	7,719	7,865	+1.9
Average number of days worked [4]	188	191	+1.6
Average number of men working daily [4]	179,636	169,400	−5.7
Production per man per day [4] .... net tons	12.22	12.83	+5.0
Fuel efficiency indicator: Pounds of coal per kilowatt-hour at electric powerplants [5]	.89	.88	−1.1

[1] Bureau of the Census, U.S. Department of Commerce.
[2] Interstate Commerce Commission.
[3] Bureau of Labor Statistics, U.S. Department of Labor.
[4] Accident Analysis Branch, Federal Bureau of Mines.
[5] Federal Power Commission.

RESERVES*

TABLE 2.—Coal reserves of the United States, January 1, 1960, by States [1]

(Million short tons)

State	Date of publication of estimate	Estimated original reserves					Reserves depleted to Jan. 1, 1960		Remaining reserves Jan. 1, 1960	Recoverable reserves, Jan. 1, 1960, assuming 50 percent recovery
		Bituminous coal	Subbituminous coal	Lignite	Anthracite and semianthracite	Total	Production [1]	Production plus loss in mining [2]		
ALABAMA [3]	(4)	[5] 13,754	------	20	------	[5] 13,774	[6] 23	[6] 46	13,728	6,864
ALASKA	(7)	21,401	[8] 71,136	(8)	2,101	94,638	13	26	94,612	47,306
ARKANSAS	(4)	1,816	------	350	456	2,622	99	198	2,424	1,212
COLORADO	1959	63,203	18,492	------	90	81,785	506	1,012	80,773	40,387
GEORGIA	1953	100	------	------	------	100	12	24	76	38
ILLINOIS	1953	[9] 137,329	------	------	------	[9] 137,329	[10] 474	[10] 948	136,381	68,190
INDIANA	1953	37,293	------	------	------	37,293	1,148	2,296	34,997	17,499
Iowa [11]	1909	29,160	------	------	------	29,160	357	714	28,446	14,223
KANSAS	B-1951 L-1952	[9] 20,774	------	(12)	------	[9] 20,774	[10] 13	[10] 26	20,748	10,374
KENTUCKY	(4)	72,318	------	------	------	72,318	2,646	5,292	67,026	33,513
MARYLAND	1953	[9] 1,200	------	------	------	[9] 1,200	[10] 6	[10] 12	1,188	594
MICHIGAN	1950	297	------	------	------	297	46	92	205	102
Missouri	1913	79,362	------	------	------	79,362	287	574	78,788	39,394
MONTANA	1949	2,363	132,151	87,533	------	222,047	171	342	221,705	110,853
NEW MEXICO	1950	10,948	50,801	------	6	61,755	125	250	61,505	30,753
NORTH CAROLINA	1955	112	------	------	------	112	1	2	110	55
NORTH DAKOTA	1953	------	------	350,910	------	350,910	96	192	350,718	175,359
OHIO	(4)	46,488	------	------	------	46,488	2,052	4,104	42,384	21,192
OKLAHOMA	1957	3,673	------	(12)	------	3,673	180	360	3,313	1,656
OREGON	1955	20	180	------	------	200	3	6	194	97
PENNSYLVANIA	B-1928 A-1945	75,093	------	------	22,805	97,898	13,508	27,016	70,882	35,441
SOUTH DAKOTA	1952	------	------	2,033	------	2,033	1	2	2,031	1,015
TENNESSEE	1959	[13] 1,912	------	------	------	[13] 1,912	[14] 6	[14] 12	1,900	950
Texas [15]	B-1909 L-1955	8,000	------	7,070	------	15,070	95	190	14,880	7,440
UTAH	(7)	28,222	156	------	------	28,378	260	520	27,858	13,929
VIRGINIA	1952	11,696	------	------	355	12,051	782	1,564	10,487	5,244

Washington	1929	11,413	[8] 52,442	([8])	23	63,878	149	298	63,580	31,790
WEST VIRGINIA	1940	116,618	------------	------------	------------	116,618	6,369	12,738	103,880	51,940
WYOMING	1950	13,235	[9] 108,319	([8])	------------	121,554	402	804	120,750	60,375
Other States	------------	[16] 620	[17] 4,065	[18] 50	------------	4,735	7	14	4,721	2,360
Total	------------	808,420	437,742	447,966	25,836	1,719,964	[19] 29.837	59,674	1,660,290	830,145

*Averitt, Paul, Coal Reserves of the United States, January 1, 1960: Article in Geological Survey Research, 1960, Geol. Survey Prof. Paper 400-B, 1960, pp. 81-82.

[1] Production, 1800 through 1885, from "The first century and a quarter of American coal industry," by H. N. Eavenson, privately printed, Pittsburgh, 1942; production, 1886 through 1923, from Federal Geol. Survey Mineral Resources, annual volumes; production, 1924 through 1957, from Federal Bureau of Mines Mineral Resources (1924-31) and Minerals Yearbook (1932-57), annual volumes, augmented for some States by records of State mine inspectors; production, 1958, from Federal Bureau of Mines, Mineral Market Summary No. 2974, Sept. 9, 1959; production, 1959, from Federal Bureau of Mines weekly coal reports and partly estimated.

[2] Assuming past losses equal past production.

[3] Reserve estimates of States in capital letters supersede estimates prepared by or under the direction of M. R. Campbell prior to 1928.

[4] New estimate from report in preparation or in press. See text.

[5] Remaining reserves, Jan. 1, 1958.

[6] Production 1958 and 1959 only.

[7] New estimate presented for first time in this report.

[8] Small reserves and production of lignite included under subbituminous coal.

[9] Remaining reserves, Jan. 1, 1950.

[10] Production 1950 through 1959.

[11] Reserve estimates of States in lower case letters were prepared by or under the direction of M. R. Campbell prior to 1928.

[12] Small reserves of lignite in beds generally less than 30 inches thick.

[13] Remaining reserves, Jan. 1, 1959.

[14] Estimated production 1959 only.

[15] New estimate of lignite reserves; Campbell estimate of bituminous coal reserves.

[16] Arizona, California, Idaho, Nebraska, and Nevada.

[17] Arizona, California, and Idaho.

[18] California, Idaho, Louisiana, and Nevada.

[19] Less than total recorded production of about 34.8 billion tons. See footnotes 5, 6, 9, 10, 13, and 14.

THICKNESS OF BITUMINOUS COAL AND LIGNITE SEAMS

The Bureau of Mines compiled and published detailed data on thickness of seams for coal mines in 1955.[4] Because of the importance of seam thickness in mining, these data for 1955 follow. See also figure 1.

TABLE 3.—Number and production of bituminous coal and lignite mines in the United States, 1955, classified by thickness of seams mined

Item	Less than 2 feet	2 to 3 feet	3 to 4 feet	4 to 5 feet	5 to 6 feet	6 to 7 feet	7 to 8 feet	8 feet and over	Total
Number of mines:									
Underground	32	1,289	2,467	1,243	438	251	152	163	6,035
Strip	117	484	503	267	113	47	23	63	1,617
Auger		35	78	67	14	7		3	204
Total	149	1,808	3,048	1,577	565	305	175	229	7,856
Percentage of mines:									
Underground	.5	21.4	40.9	20.6	7.2	4.2	2.5	2.7	100.0
Strip	7.3	30.0	31.1	16.5	7.0	2.9	1.4	3.8	100.0
Auger		17.2	38.2	32.8	6.9	3.4		1.5	100.0
Total	1.9	23.0	38.8	20.1	7.2	3.9	2.2	2.9	100.0
Production (thousand tons):									
Underground	269	17,610	81,934	69,650	65,621	50,397	35,107	22,877	343,465
Strip	4,232	19,303	31,516	29,016	17,579	5,923	1,077	6,447	15,093
Auger		423	1,627	2,774	661	525		65	6,075
Total	4,501	37,336	115,077	101,440	83,861	56,845	36,184	29,389	464,623
Percentage of production:									
Underground	.1	5.1	23.9	20.2	19.1	14.7	10.2	6.7	100.0
Strip	3.7	16.8	27.4	25.2	15.2	5.2	.9	5.6	100.0
Auger		7.0	26.8	45.7	10.9	8.6		1.0	100.0
Total	1.0	8.0	24.8	21.8	18.1	12.2	7.8	6.3	100.0

[4] Young, W. H., and Anderson, R. L., Thickness of Bituminous-Coal and Lignite Seams at All Mines, and Thickness of Overburden at Strip Mines in the United States in 1955: Bureau of Mines Inf. Circ. 7812, 1957, 11 pp.

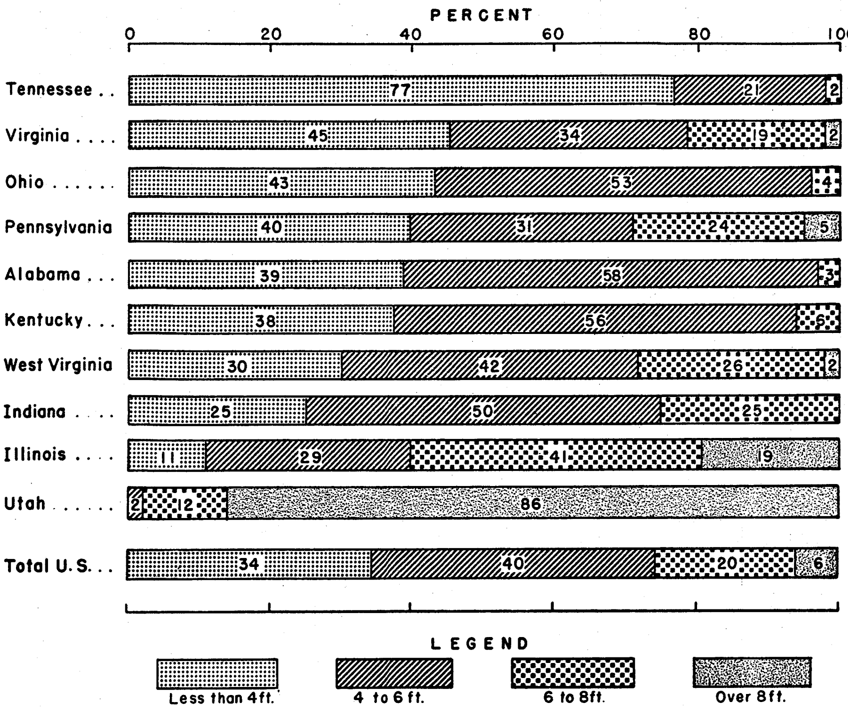

FIGURE 1.—Percentage of bituminous coal and lignite produced in the 10 leading coal-producing States and total United States, 1955, by thickness of seams mined.

TABLE 4.—Number of mines, production, output per man per day, and average thickness of seams mined, at underground, strip, and auger bituminous coal and lignite mines in the United States, by States, in 1955

State	Underground mines				Strip mines				Auger mines				Total, all mines			
	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)
Alabama	195	10,970,610	6.25	4.4	39	2,110,979	14.64	3.2	1	6,888	20.00	8.0	235	13,088,477	6.89	4.6
Alaska	6	239,571	5.64	20.7	7	400,125	16.94	23.7	------	------	------	------	13	639,696	9.68	22.6
Arizona	2	8,898	2.78	5.5	------	------	------	------	------	------	------	------	2	8,898	2.78	5.5
Arkansas	19	317,001	4.36	2.6	8	260,725	11.65	1.7	------	------	------	------	27	577,726	6.08	2.2
Colorado	110	3,211,125	5.84	7.1	7	356,805	24.41	6.2	------	------	------	------	117	3,567,930	6.32	7.0
Georgia	6	12,471	2.70	1.5	------	------	------	------	------	------	------	------	6	12,471	2.70	1.5
Illinois	103	27,256,495	14.23	7.3	68	18,675,619	23.87	4.8	------	------	------	------	171	45,932,114	17.02	6.3
Indiana	44	4,967,089	10.66	6.2	56	11,182,221	27.14	4.4	------	------	------	------	100	16,149,310	18.39	5.0
Iowa	30	297,490	4.33	4.5	30	960,867	16.35	3.9	------	------	------	------	60	1,258,357	9.87	4.1
Kansas	5	14,819	3.17	2.7	19	727,463	11.97	1.6	------	------	------	------	24	742,282	11.34	1.6
Kentucky	1,852	54,440,144	8.38	4.4	118	13,643,240	25.36	4.8	34	936,526	19.17	4.4	2,004	69,019,910	9.75	4.4
Maryland	58	275,454	3.82	3.8	26	237,015	12.22	4.7	------	------	------	------	84	512,469	5.60	4.2
Missouri	19	157,103	2.99	3.6	28	3,075,382	20.69	2.5	------	------	------	------	47	3,232,485	16.06	2.6
Montana (bit. & lig.)	19	439,285	7.95	5.8	5	807,968	67.25	23.5	------	------	------	------	24	1,247,253	18.54	17.3
New Mexico	28	174,299	3.86	5.8	3	27,280	14.44	6.3	------	------	------	------	31	201,579	4.28	5.9
North Dakota (lignite)	5	21,357	7.99	10.1	40	3,080,730	35.90	12.1	------	------	------	------	45	3,102,087	35.06	12.1
Ohio	233	12,632,165	8.47	4.8	259	23,958,329	22.83	3.8	38	1,279,297	35.38	4.1	530	37,869,791	14.70	4.2
Oklahoma	14	694,323	4.57	3.7	21	1,469,213	17.75	2.3	------	------	------	------	35	2,163,536	9.22	2.8
Pennsylvania	797	64,904,231	7.19	5.5	585	20,518,113	14.99	3.2	29	291,112	13.50	3.0	1,411	85,713,456	8.23	4.9
South Dakota (lignite)	------	------	------	------	2	25,782	10.31	4.5	------	------	------	------	2	25,782	10.31	4.5
Tennessee	409	5,340,664	5.72	3.9	87	1,635,052	16.72	2.5	8	77,128	11.62	3.3	504	7,052,844	6.79	3.6
Utah	50	6,295,524	9.75	11.1	------	------	------	------	------	------	------	------	50	6,295,524	9.75	11.1
Virginia	1,007	22,241,262	7.19	4.5	31	981,782	13.78	5.0	21	284,465	14.06	4.5	1,059	23,507,509	7.38	4.5
Washington	12	578,076	5.01	7.6	1	31,714	25.66	5.5	------	------	------	------	13	609,790	5.24	7.5
West Virginia	996	126,588,262	8.86	5.1	168	9,379,643	22.96	5.8	73	3,199,984	22.92	4.7	1,237	139,167,889	9.38	5.1
Wyoming	16	1,387,521	9.35	8.0	8	1,539,072	36.32	33.1	------	------	------	------	24	2,926,593	15.34	21.2
Total	6,035	343,465,239	8.28	5.3	1,616	115,085,119	21.12	4.9	204	6,075,400	22.22	4.4	7,855	464,625,758	9.84	5.2

DOMESTIC PRODUCTION

TABLE 5.—Growth of the bituminous coal and lignite mining industry in the United States

Year	Production (net tons)	Value of production		Number of mines	Capacity at 280 days (million tons)	Foreign trade [1]	
		Total	Average per ton			Exports (net tons)	Imports (net tons)
1890	111,302,322	$110,420,801	$0.99	(2)	137	1,272,396	1,047,416
1891	117,901,238	117,188,400	.99	(2)	148	1,651,694	1,181,677
1892	126,856,567	125,124,381	.99	(2)	162	1,904,556	1,491,800
1893	128,385,231	122,751,618	.96	(2)	174	1,986,383	1,234,499
1894	118,820,405	107,653,501	.91	(2)	196	2,439,720	1,286,268
1895	135,118,193	115,779,771	.86	2,555	196	2,659,987	1,411,323
1896	137,640,276	114,891,515	.83	2,599	202	2,515,838	1,393,095
1897	147,617,519	119,595,224	.81	2,454	213	2,670,157	1,442,534
1898	166,593,623	132,608,713	.80	2,862	221	3,004,304	1,426,108
1899	193,323,187	167,952,104	.87	3,245	230	3,897,994	1,409,838
1900	212,316,112	220,930,313	1.04	(2)	255	6,060,688	1,911,925
1901	225,828,149	236,422,049	1.05	(2)	281	6,455,085	2,214,507
1902	260,216,844	290,858,483	1.12	(2)	316	6,048,777	2,174,393
1903	282,749,348	351,687,933	1.24	(2)	350	5,835,561	4,043,519
1904	278,659,689	305,397,001	1.10	4,650	386	7,206,879	2,179,882
1905	315,062,785	334,658,294	1.06	5,060	417	7,512,723	1,704,810
1906	342,874,867	381,162,115	1.11	4,430	451	8,014,263	2,039,169
1907	394,759,112	451,214,842	1.14	4,550	473	9,869,812	1,892,653
1908	332,573,944	374,135,268	1.12	4,730	482	11,071,152	2,219,243
1909	379,744,257	405,486,777	1.07	5,775	510	10,101,131	1,375,201
1910	417,111,142	469,281,719	1.12	5,818	538	11,663,052	1,819,766
1911	405,907,059	451,375,819	1.11	5,887	538	13,259,791	1,972,555
1912	450,104,982	517,983,445	1.15	5,747	566	16,475,029	1,456,333
1913	478,435,297	565,234,952	1.18	5,776	577	18,013,073	1,767,656
1914	422,703,970	493,309,244	1.17	5,592	608	17,589,562	1,520,962
1915	442,624,426	502,037,688	1.13	5,502	610	18,776,640	1,703,785
1916	502,519,682	665,116,077	1.32	5,726	613	21,254,627	1,713,837
1917	551,790,563	1,249,272,837	2.26	6,939	636	23,839,558	1,448,453
1918	579,385,820	1,491,809,940	2.58	8,319	650	22,350,730	1,457,073
1919	465,860,058	1,160,616,013	2.49	8,994	669	20,113,536	1,011,550
1920	568,666,683	2,129,933,000	3.75	8,921	725	38,517,084	1,244,990
1921	415,921,950	1,199,983,600	2.89	8,038	781	23,131,166	1,257,589
1922	422,268,099	1,274,820,000	3.02	9,299	832	12,413,085	5,059,999
1923	564,564,662	1,514,621,000	2.68	9,331	885	21,453,579	1,882,306
1924	483,686,538	1,062,626,000	2.20	7,586	792	17,100,347	417,226
1925	520,052,741	1,060,402,000	2.04	7,144	748	17,461,560	601,737
1926	573,366,985	1,183,412,000	2.06	7,177	747	35,271,937	485,666
1927	517,763,352	1,029,657,000	1.99	7,011	759	18,011,744	549,843
1928	500,744,970	933,774,000	1.86	6,450	691	16,164,485	546,526
1929	534,988,593	952,781,000	1.78	6,057	679	17,429,298	495,219
1930	467,526,299	795,483,000	1.70	5,891	700	15,877,407	240,886
1931	382,089,396	588,895,000	1.54	5,642	669	12,126,299	206,303
1932	309,709,872	406,677,000	1.31	5,427	594	8,814,047	186,909
1933	333,630,533	445,788,000	1.34	5,555	559	9,036,947	197,429
1934	359,368,022	628,383,000	1.75	6,258	565	10,868,552	179,661
1935	372,373,122	658,063,000	1.77	6,315	582	9,742,430	201,871
1936	439,087,903	770,955,000	1.76	6,875	618	10,654,959	271,798
1937	445,531,449	864,042,000	1.94	6,548	646	13,144,678	257,996
1938	348,544,764	678,653,000	1.95	5,777	602	10,490,269	241,305
1939	394,855,325	728,348,366	1.84	5,820	621	11,590,478	355,115
1940	460,771,500	879,327,227	1.91	6,324	639	16,465,928	371,571
1941	514,149,245	1,125,362,836	2.19	6,822	666	20,740,471	390,049
1942	582,692,937	1,373,990,608	2.36	6,972	663	22,943,305	498,103
1943	590,177,069	1,584,644,477	2.69	6,620	626	25,836,208	757,634
1944	619,576,240	1,810,900,542	2.92	6,928	624	26,032,348	633,689
1945	577,617,327	1,768,204,320	3.06	7,033	620	27,956,192	467,473
1946	533,922,068	1,835,539,476	3.44	7,333	699	41,197,378	434,680
1947	630,623,722	2,622,634,946	4.16	8,700	755	68,666,963	290,141
1948	599,518,229	2,993,267,021	4.99	9,079	774	45,930,133	291,337
1949	437,868,036	2,136,870,571	4.88	8,559	781	27,842,056	314,980

See footnotes at end of table.

TABLE 5.—Growth of the bituminous coal and lignite mining industry in the United States—Continued

Year	Production (net tons)	Value of production		Number of mines	Capacity at 280 days (million tons)	Foreign trade [1]	
		Total	Average per ton			Exports (net tons)	Imports (net tons)
1950	516,311,053	$2,500,373,779	$4.84	9,429	790	25,468,403	346,706
1951	533,664,732	2,626,030,137	4.92	8,009	736	56,721,547	292,378
1952	466,840,782	2,289,180,401	4.90	7,275	703	47,643,150	262,268
1953	457,290,449	2,247,828,694	4.92	6,671	670	33,760,263	226,900
1954	391,706,300	1,769,619,723	4.52	6,130	603	31,040,465	198,799
1955	464,633,408	2,092,382,737	4.50	7,856	620	51,277,256	337,145
1956	500,874,077	2,412,004,151	4.82	8,520	655	68,552,629	355,701
1957	492,703,916	2,504,406,042	5.08	8,539	680	76,445,529	366,506
1958	410,445,547	1,996,281,274	4.86	8,264	625	50,293,382	306,940
1959	412,027,502	1,965,606,901	4.77	7,719	614	37,226,766	374,713
1960	415,512,347	1,950,425,049	4.69	7,865	609	36,491,424	260,495

[1] Figures for 1890–1914 represent fiscal year ended June 30. [2] Data not available.

TABLE 6.—Growth of the bituminous coal and lignite mining industry in the United States

Year	Men employed	Average number of days worked	Average days lost per man on strike	Net tons per man—		Percentage of underground production—		Percentage of total production—	
				Per day	Per year	Cut by machines [1]	Mechanically loaded	Mechanically cleaned [2]	Mined by stripping
1890	192,204	226	(3)	2.56	579	(3)	(3)	(3)	(3)
1891	205,803	223	(3)	2.57	573	5.3	(3)	(3)	(3)
1892	212,893	219	(3)	2.72	596	(3)	(3)	(3)	(3)
1893	230,365	204	(3)	2.73	557	(3)	(3)	(3)	(3)
1894	244,603	171	(3)	2.84	486	(3)	(3)	(3)	(3)
1895	239,962	194	(3)	2.90	563	(3)	(3)	(3)	(3)
1896	244,171	192	(3)	2.94	564	11.9	(3)	(3)	(3)
1897	247,817	196	(3)	3.04	596	15.3	(3)	(3)	(3)
1898	255,717	211	(3)	3.09	651	19.5	(3)	(3)	(3)
1899	271,027	234	46	3.05	713	22.7	(3)	(3)	(3)
1900	304,375	234	43	2.98	697	24.9	(3)	(3)	(3)
1901	340,235	225	35	2.94	664	25.6	(3)	(3)	(3)
1902	370,056	230	44	3.06	703	26.8	(3)	(3)	(3)
1903	415,777	225	28	3.02	680	27.6	(3)	(3)	(3)
1904	437,832	202	44	3.15	637	28.2	(3)	(3)	(3)
1905	460,629	211	23	3.24	684	32.8	(3)	(3)	(3)
1906	478,425	213	63	3.36	717	34.7	(3)	2.7	(3)
1907	513,258	234	14	3.29	769	35.1	(3)	2.9	(3)
1908	516,264	193	38	3.34	644	37.0	(3)	3.6	(3)
1909	543,152	209	29	3.34	699	37.5	(3)	3.8	(3)
1910	555,533	217	89	3.46	751	41.7	(3)	3.8	(3)
1911	549,775	211	27	3.50	738	43.9	(3)	(3)	(3)
1912	548,632	223	35	3.68	820	46.8	(3)	3.9	(3)
1913	571,882	232	36	3.61	837	50.7	(3)	4.6	(3)
1914	583,506	195	80	3.71	724	51.8	(3)	4.8	0.3

See footnotes at end of table.

TABLE 6.—Growth of the bituminous coal and lignite mining industry in the United States—Continued

Year	Men employed	Average number of days worked	Average days lost per man on strike	Net tons per man—		Percentage of underground production—		Percentage of total production—	
				Per day	Per year	Cut by machines [1]	Mechanically loaded	Mechanically cleaned [2]	Mined by stripping
1915	557,456	203	61	3.91	794	55.3	(3)	4.7	0.6
1916	561,102	230	26	3.90	896	56.9	(3)	4.6	.8
1917	603,143	243	17	3.77	915	56.1	(3)	4.6	1.0
1918	615,305	249	7	3.78	942	56.7	(3)	3.8	1.4
1919	621,998	195	37	3.84	749	60.0	(3)	3.6	1.2
1920	639,547	220	22	4.00	881	60.7	(3)	3.3	1.5
1921	663,754	149	23	4.20	627	66.4	(3)	3.4	1.2
1922	687,958	142	117	4.28	609	64.8	(3)	(3)	2.4
1923	704,793	179	20	4.47	801	68.3	0.3	3.8	2.1
1924	619,604	171	73	4.56	781	71.5	.7	(3)	2.8
1925	588,493	195	30	4.52	884	72.9	1.2	(3)	3.2
1926	593,647	215	24	4.50	966	73.8	1.9	(3)	3.0
1927	593,918	191	153	4.55	872	74.9	3.3	5.3	3.6
1928	522,150	203	83	4.73	959	76.9	4.5	5.7	4.0
1929	502,993	219	11	4.85	1,064	78.4	7.4	6.9	3.8
1930	493,202	187	43	5.06	948	81.0	10.5	8.3	4.3
1931	450,213	160	35	5.30	849	83.2	13.1	9.5	5.0
1932	406,380	146	120	5.22	762	84.1	12.3	9.8	6.3
1933	418,703	167	30	4.78	797	84.7	12.0	10.4	5.5
1934	458,011	178	15	4.40	785	84.1	12.2	11.1	5.8
1935	462,403	179	[4] 7	4.50	805	84.2	13.5	12.2	6.4
1936	477,204	199	21	4.62	920	84.8	16.3	13.9	6.4
1937	491,864	193	[4] 19	4.69	906	(3)	20.2	14.6	7.1
1938	441,333	162	13	4.89	790	87.5	26.7	18.2	8.7
1939	421,788	178	36	5.25	936	87.9	31.0	20.1	9.6
1940	439,075	202	8	5.19	1,049	88.4	35.4	22.2	9.2
1941	456,981	216	27	5.20	1,125	89.0	40.7	22.9	10.7
1942	461,991	246	7	5.12	1,261	89.7	45.2	24.4	11.5
1943	416,007	264	[4] 15	5.38	1,419	90.3	48.9	24.7	13.5
1944	393,347	278	[4] 5	5.67	1,575	90.5	52.9	25.6	16.3
1945	383,100	261	[4] 9	5.78	1,508	90.8	56.1	25.6	19.0
1946	[5] 396,434	214	[4] 23	6.30	1,347	90.8	58.4	26.0	21.1
1947	[5] 419,182	234	[4] 5	6.42	1,504	90.0	60.7	27.7	22.1
1948	[5] 441,631	217	[4] 16	6.26	1,358	90.7	64.3	30.2	23.3
1949	[5] 433,698	157	[4] 15	6.43	1,010	91.4	67.0	35.1	24.2
1950	[5] 415,582	183	[4] 56	6.77	1,239	91.8	69.4	38.5	23.9
1951	[5] 372,897	203	[4] 4	7.04	1,429	93.4	73.1	45.0	22.0
1952	[5] 335,217	186	[4] 6	7.47	1,389	92.8	75.6	48.7	23.3
1953	[5] 293,106	191	[4] 3	8.17	1,560	92.3	79.6	52.9	23.1
1954	[5] 227,397	182	[4] 4	9.47	1,724	88.8	84.0	59.4	25.1
1955	[5] 225,093	210	[4] 4	9.84	2,064	88.1	84.6	58.7	24.8
1956	[5] 228,163	214	[4] 4	10.28	2,195	84.6	84.0	58.4	25.4
1957	[5] 228,635	203	[4] 3	10.59	2,155	80.9	84.8	61.7	25.2
1958	[5] 197,402	184	[4] 3	11.33	2,079	75.3	84.9	63.1	28.3
1959	[5] 179,636	188	[4] 24	12.22	2,294	72.1	86.0	65.5	29.4
1960	[5] 169,400	191	[4] 4	12.83	2,453	67.8	86.3	65.7	29.5

[1] Percentages for 1890–1913 are of total production, as a separation of underground and strip production is not available for these years.
[2] Percentages for 1906–26 are exclusive of coal cleaned at central washeries operated by consumers.
[3] Data not available.
[4] Bureau of Labor Statistics, U.S. Department of Labor.
[5] Average number of men working daily.

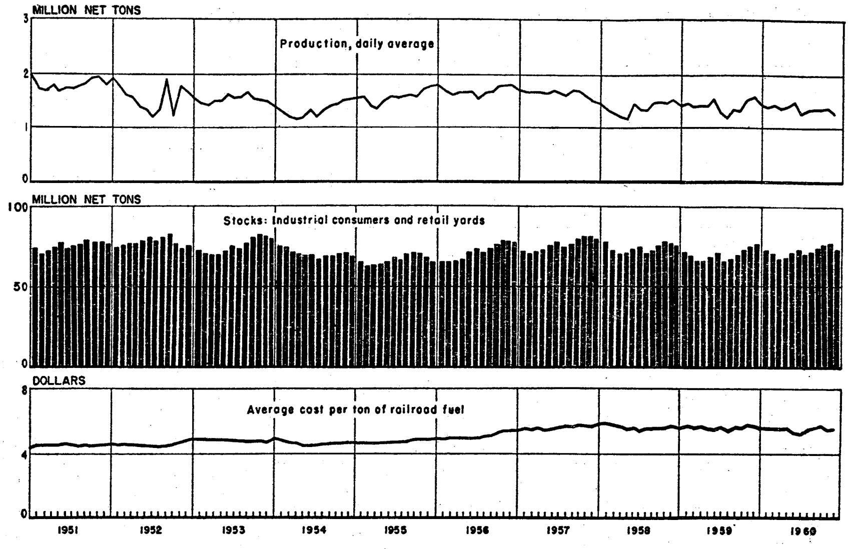

FIGURE 2.—Trends of production, stocks, and railroad-fuel prices of bituminous coal and lignite in the United States, 1951–60

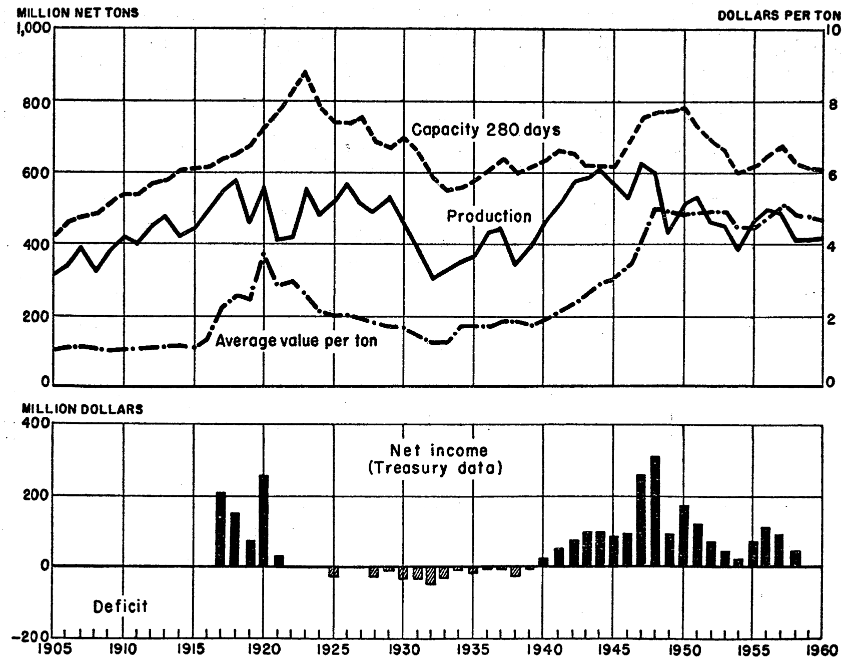

FIGURE 3.—Trends of bituminous coal and lignite production, realization, mine capacity, and net income or deficit in the United States, 1905–60.

PRODUCTION BY MONTHS AND WEEKS

The figures on monthly and weekly production are estimates based upon (1) railroad carloadings of coal reported daily and weekly by all important carriers, (2) shipments on the Allegheny and Monongahela Rivers reported by the U.S. Army Engineers, (3) direct reports from mining companies, and (4) monthly production statements compiled by certain local operators' associations and State mine departments. In computing the estimates, allowance is made for commercial truck shipments, local sales, colliery fuel, and small truck mines producing over 1000 tons a year. Preliminary estimates are made currently and published in the Weekly Coal Reports. These preliminary estimates have proved very reliable and for many years have been within approximately 1 percent of the final figure of total production, based upon complete coverage of all mines producing over 1,000 tons a year. The preliminary estimates are later revised to agree with the final total production based on the canvass. Thus, the monthly and weekly estimates of production, summarized in tables 7–10, represent final figures and vary slightly from the preliminary figures of production published in the Weekly Coal Reports. See also figures 2, 4, and 5.

FIGURE 4.—Production of bituminous coal and lignite in the United States, 1959–60, by weeks.

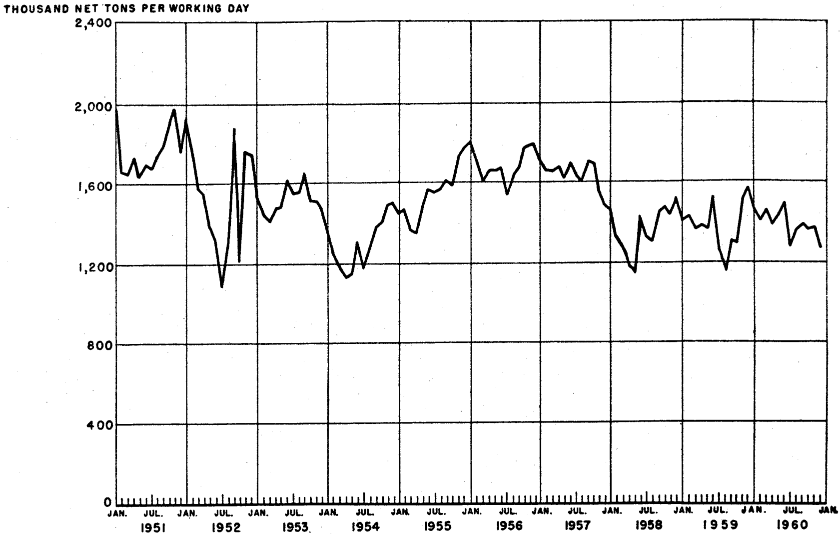

FIGURE 5.—Average production of bituminous coal and lignite in the United States per working day in each month, 1951–60.

TABLE 7.—Production of bituminous coal and lignite in the United States with estimates by months

Month	Production (thousand net tons)		Maximum number of working days		Average production per working day (thousand net tons)	
	1959	1960	1959	1960	1959	1960
January	36,485	36,648	26	25	1,403	1,466
February	34,273	35,180	24	25	1,428	1,407
March	35,396	39,306	26	27	1,361	1,456
April	35,096	35,156	25.4	25.4	1,382	1,384
May	35,495	36,455	25.8	25.5	1,376	1,430
June	36,775	33,788	24.1	22.6	1,526	1,495
July	24,377	25,419	19.4	19.9	1,257	1,277
August	30,088	36,681	26	27	1,157	1,359
September	32,571	34,700	25	25	1,303	1,388
October	34,921	35,499	27	26	1,293	1,365
November	35,997	33,589	23.8	24.5	1,512	1,371
December	40,554	33,091	26	26	1,560	1,273
Total	412,028	415,512	298.5	298.9	1,380	1,390

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TABLE 8.—Production of bituminous coal and lignite in the United States in 1960, by States, with estimates by months

(Thousand net tons)

[Totals for year are based on final complete returns from all operators known to have produced 1,000 or more tons per year. Monthly apportionment is based on current records of railroad carloadings and shipments on the Allegheny and Monongahela Rivers, supplemented by direct reports from local sources]

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
Alabama	1,223	1,238	1,309	1,118	1,157	947	788	1,111	1,067	1,003	1,058	992	13,011
Alaska	66	73	71	67	43	21	24	54	63	82	76	83	723
Arkansas	49	51	51	29	28	28	21	26	28	32	31	35	409
Colorado	431	415	419	269	223	195	134	232	252	322	347	368	3,607
Illinois	4,089	4,009	4,473	3,411	3,436	3,426	2,680	4,165	3,987	4,084	4,070	4,147	45,977
Indiana	1,489	1,460	1,582	1,101	1,142	1,117	856	1,260	1,210	1,321	1,412	1,588	15,538
Iowa	107	101	106	72	71	67	60	78	75	88	114	129	1,068
Kansas	77	69	111	61	53	53	36	78	83	102	82	83	888
Kentucky:													
Eastern	3,050	2,680	3,227	3,161	3,353	2,992	2,231	3,279	3,228	3,366	2,910	2,783	36,260
Western	2,583	2,434	2,814	2,293	2,638	2,463	2,032	2,818	2,688	2,657	2,602	2,565	30,587
Total Kentucky	5,633	5,114	6,041	5,454	5,991	5,455	4,263	6,097	5,916	6,023	5,512	5,348	66,847
Maryland	71	69	67	52	45	56	47	59	63	69	73	77	748
Missouri	263	250	343	167	160	170	158	222	272	235	287	363	2,890
Montana:													
Bituminous	11	11	13	7	6	5	6	9	8	9	12	16	113
Lignite	19	20	24	13	12	9	11	14	14	16	21	27	200
Total Montana	30	31	37	20	18	14	17	23	22	25	33	43	313
New Mexico	29	37	40	24	23	27	2	34	17	16	22	24	295
North Dakota (lignite)	272	228	290	173	125	129	106	121	189	253	300	339	2,525
Ohio	2,286	2,047	2,567	3,054	3,370	3,478	2,667	3,133	3,314	3,376	2,527	2,138	33,957
Oklahoma	146	140	154	122	127	133	82	102	68	81	84	103	1,342
Pennsylvania	6,452	6,365	7,028	6,001	5,748	4,957	3,604	5,310	4,691	5,108	5,176	4,985	65,425
South Dakota (lignite)	2	2	2	2	2	1	1	1	1	2	2	2	20
Tennessee	444	416	408	489	593	473	432	588	534	505	519	530	5,931
Utah	508	482	489	334	360	328	157	456	416	448	476	501	4,955
Virginia	2,199	2,281	2,348	2,541	2,620	2,343	1,986	2,448	2,198	2,352	2,247	2,275	27,838
Washington	28	24	25	15	16	15	15	20	11	18	15	26	228
West Virginia	10,553	10,119	11,146	10,475	11,004	10,249	7,209	10,939	10,055	9,714	8,879	8,602	118,944
Wyoming	199	157	198	105	100	106	74	124	168	240	245	308	2,024
Other States [1]	2	2	1	-------	-------	-------	-------	-------	-------	-------	2	2	9
Total	36,648	35,180	39,306	35,156	36,455	33,788	25,419	36,681	34,700	35,499	33,589	33,091	415,512

[1] Includes Arizona and Georgia.

TABLE 9.—Production of bituminous coal and lignite in the United States in 1960, by districts, with estimates by months

(Thousand net tons)

[Totals for year are based on final complete returns from all operators known to have produced 1,000 or more tons per year. Monthly apportionment is based on current records of railroad carloadings and shipments on the Allegheny and Monongahela Rivers, supplemented by direct reports from local sources]

District	January	February	March	April	May	June	July	August	September	October	November	December	Total
1. Eastern Pennsylvania	2,909	2,867	3,155	2,692	2,575	2,243	1,634	2,401	2,133	2,318	2,352	2,274	29,553
2. Western Pennsylvania	3,652	3,602	3,978	3,396	3,253	2,805	2,040	3,005	2,655	2,891	2,929	2,821	37,027
3. Northern West Virginia	3,367	3,192	3,364	3,118	3,097	3,074	2,055	3,342	2,988	2,880	2,856	2,885	36,218
4. Ohio	2,286	2,047	2,567	3,054	3,370	3,478	2,667	3,133	3,314	3,376	2,527	2,138	33,957
5. Michigan	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
6. Panhandle	402	391	402	370	369	366	287	368	346	342	340	343	4,326
7. Southern numbered 1	2,944	2,918	3,262	3,080	3,340	2,933	2,175	3,110	2,716	2,681	2,335	2,167	33,661
8. Southern numbered 2	9,368	8,841	9,946	9,923	10,560	9,514	7,195	10,229	9,778	9,858	8,844	8,610	112,666
9. West Kentucky	2,583	2,434	2,814	2,293	2,638	2,463	2,032	2,818	2,688	2,657	2,602	2,565	30,587
10. Illinois	4,089	4,009	4,473	3,411	3,436	3,426	2,680	4,165	3,987	4,084	4,070	4,147	45,977
11. Indiana	1,489	1,460	1,582	1,101	1,142	1,117	856	1,260	1,210	1,321	1,412	1,588	15,538
12. Iowa	107	101	106	72	71	67	60	78	75	88	114	129	1,068
13. Southeastern	1,351	1,358	1,426	1,258	1,326	1,082	911	1,279	1,220	1,147	1,207	1,145	14,710
14. Arkansas-Oklahoma	117	117	123	86	87	90	59	74	60	70	70	83	1,036
15. Southwestern	418	393	536	293	281	294	238	354	391	380	414	501	4,493
16. Northern Colorado	90	71	94	38	46	43	13	31	40	78	93	108	745
17. Southern Colorado	362	371	354	248	194	171	122	225	224	256	270	277	3,074
18. New Mexico	9	11	12	7	6	8	1	10	5	4	7	8	88
19. Wyoming	199	157	198	105	100	106	74	124	168	240	245	308	2,024
20. Utah	508	482	489	334	360	328	157	456	416	448	476	501	4,955
21. North-South Dakota	274	230	292	175	127	130	107	122	190	255	302	341	2,545
22. Montana	30	31	37	20	18	14	17	23	22	25	33	43	313
23. Washington	94	97	96	82	59	36	39	74	74	100	91	109	951
Total	36,648	35,180	39,306	35,156	36,455	33,788	25,419	36,681	34,700	35,499	33,589	33,091	415,512

TABLE 10.—Production of bituminous coal and lignite in the United States with estimates by weeks

1959				1960			
Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)	Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)
Jan. 3	[1] 1,777	[1] 2	[2] 1,403	Jan. 2	[1] 485	[1] 1	[2] 1,465
Jan. 10	8,604	6	1,434	Jan. 9	9,211	6	1,535
Jan. 17	8,696	6	1,449	Jan. 16	9,007	6	1,501
Jan. 24	8,394	6	1,399	Jan. 23	8,837	6	1,473
Jan. 31	9,014	6	1,502	Jan. 30	9,108	6	1,518
Feb. 7	8,772	6	1,462	Feb. 6	8,781	6	1,464
Feb. 14	8,515	6	1,419	Feb. 13	8,603	6	1,434
Feb. 21	8,400	6	1,400	Feb. 20	7,678	6	1,280
Feb. 28	8,586	6	1,431	Feb. 27	8,542	6	1,424
Mar. 7	7,927	6	1,321	Mar. 5	7,839	6	1,307
Mar. 14	7,835	6	1,306	Mar. 12	8,090	6	1,348
Mar. 21	8,183	6	1,364	Mar. 19	8,962	6	1,494
Mar. 28	8,159	6	1,360	Mar. 26	8,961	6	1,494
Apr. 4	7,157	5.4	1,325	Apr. 2	7,706	5.4	1,427
Apr. 11	8,157	6	1,360	Apr. 9	8,424	6	1,404
Apr. 18	8,190	6	1,365	Apr. 16	8,929	6	1,488
Apr. 25	8,266	6	1,378	Apr. 23	8,716	6	1,453
May 2	8,403	6	1,401	Apr. 30	8,411	6	1,402
May 9	8,500	6	1,417	May 7	8,439	6	1,407
May 16	8,384	6	1,397	May 14	8,429	6	1,405
May 23	8,537	6	1,423	May 21	8,601	6	1,434
May 30	8,289	5.8	1,429	May 28	8,617	6	1,436
June 6	8,558	6	1,426	June 4	7,890	5.5	1,435
June 13	9,166	6	1,528	June 11	8,787	6	1,465
June 20	9,404	6	1,567	June 18	8,883	6	1,481
June 27	8,805	5.7	1,545	June 25	9,070	5.8	1,564
July 4	1,844	1	1,844	July 2	1,851	1	1,851
July 11	1,564	1.8	869	July 9	1,343	1.7	790
July 18	7,388	6	1,231	July 16	7,430	6	1,238
July 25	7,397	6	1,233	July 23	8,012	6	1,335
Aug. 1	7,285	6	1,214	July 30	8,310	6	1,385
Aug. 8	6,813	6	1,136	Aug. 6	7,889	6	1,315
Aug. 15	7,243	6	1,207	Aug. 13	8,126	6	1,354
Aug. 22	7,168	6	1,195	Aug. 20	8,156	6	1,359
Aug. 29	7,343	6	1,224	Aug. 27	7,891	6	1,315
Sept. 5	7,345	6	1,224	Sept. 3	7,832	6	1,305
Sept. 12	6,414	5	1,283	Sept. 10	6,704	5	1,341
Sept. 19	7,803	6	1,301	Sept. 17	8,328	6	1,388
Sept. 26	7,809	6	1,302	Sept. 24	8,346	6	1,391
Oct. 3	7,611	6	1,269	Oct. 1	8,378	6	1,396
Oct. 10	7,767	6	1,295	Oct. 8	8,279	6	1,380
Oct. 17	7,970	6	1,328	Oct. 15	8,692	6	1,449
Oct. 24	8,101	6	1,350	Oct. 22	8,705	6	1,451
Oct. 31	7,934	6	1,322	Oct. 29	8,154	6	1,359
Nov. 7	7,824	6	1,304	Nov. 5	8,126	6	1,354
Nov. 14	9,025	5.8	1,556	Nov. 12	7,513	5.5	1,366
Nov. 21	9,602	6	1,600	Nov. 19	8,257	6	1,376
Nov. 28	8,151	5	1,630	Nov. 26	6,559	5	1,312
Dec. 5	9,221	6	1,537	Dec. 3	7,542	6	1,257
Dec. 12	9,335	6	1,556	Dec. 10	7,731	6	1,289
Dec. 19	9,569	6	1,595	Dec. 17	7,591	6	1,265
Dec. 26	6,984	5	1,397	Dec. 24	7,808	6	1,301
Jan. 2	[1] 6,840	[1] 4	[2] 1,465	Dec. 31	6,953	5	1,391
Total	412,028	298.5	1,380	Total	415,512	298.9	1,390

[1] Figures represent output and number of working days in that part of week included in calendar year shown. Total production for the week ended Jan. 3, 1959, was 7,015,000 net tons, and for Jan. 2, 1960, was 7,325,000 net tons.
[2] Average daily output for entire week and not for working days in the calendar year shown.

SUMMARY BY STATES

TABLE 11.—Bituminous coal and lignite produced in the United States, by States, with production of maximum year and cumulative production from earliest record to end of 1960, in thousand net tons

State	Maximum production		Production, by years										Total production from earliest record to end of 1960
	Year	Quantity	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	
Alabama	1926	21,001	13,597	11,383	12,532	10,282	13,088	12,663	13,260	11,182	11,947	13,011	959,645
Arkansas	1907	2,670	1,107	873	775	477	578	590	508	364	441	409	98,667
Colorado	1917	12,483	4,103	3,623	3,575	2,900	3,568	3,502	3,594	2,974	3,294	3,607	510,120
Illinois	1918	89,291	54,200	45,790	46,010	41,971	45,932	48,102	46,993	43,912	45,466	45,977	3,651,927
Indiana	1918	30,679	19,451	16,350	15,812	13,400	16,149	17,089	15,841	15,022	14,804	15,538	1,164,701
Iowa	1917	8,966	1,630	1,381	1,388	1,197	1,258	1,358	1,312	1,179	1,180	1,068	352,575
Kansas	1918	7,562	1,961	2,029	1,715	1,372	742	884	749	823	772	888	280,111
Kentucky	1947	84,241	74,972	66,114	65,060	56,964	69,020	74,555	74,667	66,312	62,810	66,847	2,711,590
Maryland	1907	5,533	589	588	530	422	512	669	748	838	842	748	266,959
Missouri	1917	5,671	3,269	2,955	2,393	2,514	3,232	3,283	2,976	2,592	2,748	2,890	289,283
Montana	1944	4,844	2,345	2,070	1,873	1,491	1,247	846	413	305	345	313	171,031
New Mexico	1918	4,023	783	760	514	123	201	158	137	117	148	295	125,403
North Dakota	1950	3,261	3,224	2,984	2,803	(1)	3,102	2,815	2,561	2,314	2,413	2,525	[2] 95,642
Ohio	1920	45,878	37,949	36,209	34,737	32,469	37,870	38,934	36,862	32,028	35,112	33,957	2,091,570
Oklahoma	1920	4,849	2,223	2,193	2,168	1,915	2,164	2,007	2,195	1,630	1,525	1,342	180,816
Pennsylvania	1918	178,551	108,164	89,181	93,331	72,010	85,713	90,287	85,365	67,771	65,347	65,425	8,294,255
Tennessee	1956	8,848	5,401	5,265	5,467	6,429	7,053	8,848	7,955	6,785	5,913	5,931	394,429
Utah	1947	7,429	6,136	6,140	6,544	5,008	6,296	6,522	6,858	5,328	4,545	4,955	262,868
Virginia	1959	29,769	21,400	21,579	19,119	16,387	23,508	28,063	29,506	26,826	29,769	27,838	815,785
Washington	1918	4,082	857	844	690	619	610	473	360	252	242	228	148,498
West Virginia	1947	176,157	163,310	141,713	134,105	115,996	139,168	155,891	156,842	119,468	119,692	118,944	6,470,988
Wyoming	1945	9,847	6,430	6,088	5,245	2,831	2,927	2,553	2,117	1,629	1,977	2,024	403,630
Other States [3]	-------	---------	564	729	904	4,929	695	782	885	795	696	752	185,522
Total	1947	630,624	533,665	466,841	457,290	391,706	464,633	500,874	492,704	410,446	412,028	415,512	29,926,015

[1] North Dakota included in "Other States" in 1954 to avoid disclosing individual operations.
[2] Excludes production of North Dakota in 1954 to avoid disclosing individual operations.
[3] Production, if any, in Alaska, Arizona, California, Georgia, Idaho, Michigan, North Carolina, Oregon, South Dakota, or Texas included in "Other States."

TABLE 12.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States

State	Number of active mines	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
Alabama	177	10,968,859	632,909	1,408,879	13,010,647	$7.10	7,405	203	1,502,763	8.66
Alaska	8	716,585	2,938	2,948	722,471	8.75	214	251	53,626	13.47
Arizona	2		5,526		5,526	10.50	18	152	2,730	2.02
Arkansas	20	401,849	7,350		409,199	7.61	442	110	48,766	8.39
Colorado	94	2,535,132	961,966	110,188	3,607,286	5.85	2,170	178	386,137	9.34
Georgia	2		4,215		4,215	5.00	12	191	2,291	1.84
Illinois	128	40,445,794	5,401,359	130,333	45,977,486	4.00	9,735	215	2,095,703	21.94
Indiana	81	13,298,946	1,530,370	708,553	15,537,869	3.96	3,496	218	763,078	20.36
Iowa	44	668,919	397,951	1,154	1,068,024	3.60	458	201	92,224	11.58
Kansas	13	709,428	177,444	1,402	888,274	4.73	226	235	53,188	16.70
Kentucky	1,864	60,958,675	5,816,511	71,306	66,846,492	4.22	27,639	175	4,823,498	13.86
Maryland	85	301,713	446,101	20	747,834	3.74	572	159	91,028	8.22
Missouri	33	1,737,656	439,166	713,388	2,890,210	4.31	1,839	144	265,628	10.88
Montana:										
Bituminous	13	58,851	51,884	2,023	112,758	6.87	113	167	18,820	5.99
Lignite	6	186,786	13,834	45	200,665	2.06	32	164	5,263	38.13
Total Montana	19	245,637	65,718	2,068	313,423	3.79	145	166	24,083	13.01
New Mexico	19	247,774	46,726	262	294,762	5.93	223	182	40,532	7.27
North Dakota (lignite)	32	1,861,796	467,964	195,195	2,524,955	2.29	343	199	68,374	36.93
Ohio	470	17,378,533	12,470,646	4,107,593	33,956,772	3.85	8,791	213	1,873,448	18.13
Oklahoma	26	1,250,659	90,498	376	1,341,533	6.79	762	193	146,836	9.14
Pennsylvania	1,282	51,401,903	12,161,647	1,861,715	65,425,265	5.29	32,651	188	6,125,654	10.68
South Dakota (lignite)	1		20,198	250	20,448	4.08	9	225	2,025	10.10
Tennessee	415	3,715,616	2,211,519	3,315	5,930,450	3.57	4,403	155	680,840	8.71
Utah	45	4,490,420	444,251	20,022	4,954,693	6.35	2,418	191	462,802	10.71
Virginia	1,268	24,321,727	3,338,300	177,868	27,837,895	4.41	13,572	207	2,805,039	9.92
Washington	10	155,032	68,801	4,312	228,145	7.54	198	178	35,311	6.46
West Virginia	1,708	111,487,861	4,906,545	2,549,871	118,944,277	5.02	51,062	193	9,854,768	12.07
Wyoming	19	1,348,729	582,546	92,921	2,024,196	3.45	597	142	84,592	23.93
Total	7,865	350,649,243	52,699,165	12,163,939	415,512,347	4.69	169,400	191	32,384,964	12.83

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, all other uses at mine, taken by locomotive tender, and transported from mine to point of use by conveyor, tram, or pipeline.

[3] Value received or charged for coal, f.o.b. mines. Includes a value, estimated by producer, for coal not sold.

TABLE 13.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by districts

District	Number of active mines	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
1. Eastern Pennsylvania	975	22,868,557	5,683,509	1,000,573	29,552,639	$4.59	15,128	189	2,866,702	10.31
2. Western Pennsylvania	407	28,990,286	7,175,723	861,162	37,027,171	5.80	18,319	185	3,386,576	10.93
3. Northern West Virginia	559	34,229,983	1,947,229	41,220	36,218,432	4.78	13,430	195	2,624,670	13.80
4. Ohio	470	17,378,533	12,470,646	4,107,593	33,956,772	3.85	8,791	213	1,873,448	18.13
5. Michigan	----	----	----	----	----	----	----	----	----	----
6. Panhandle	19	2,088,597	201,788	2,035,216	4,325,601	4.62	1,236	231	286,128	15.12
7. Southern Numbered 1	868	31,477,874	1,795,772	387,147	33,660,793	5.94	19,177	184	3,527,821	9.54
8. Southern Numbered 2	3,519	102,245,649	10,094,843	325,423	112,665,915	4.59	55,329	185	10,231,519	11.01
9. West Kentucky	127	29,159,295	1,415,309	12,004	30,586,608	3.49	5,901	216	1,275,610	23.98
10. Illinois	128	40,445,794	5,401,359	130,333	45,977,486	4.00	9,735	215	2,095,703	21.94
11. Indiana	81	13,298,946	1,530,370	708,553	15,537,869	3.96	3,496	218	763,078	20.36
12. Iowa	44	668,919	397,951	1,154	1,068,024	3.60	458	201	92,224	11.58
13. Southeastern	327	12,096,113	1,203,574	1,410,229	14,709,916	6.67	8,796	192	1,686,855	8.72
14. Arkansas-Oklahoma	35	1,024,981	11,282	92	1,036,355	7.78	751	137	102,965	10.07
15. Southwestern	57	3,074,611	703,176	715,074	4,492,861	4.63	2,518	163	411,453	10.92
16. Northern Colorado	7	514,765	222,088	8,535	745,388	4.36	271	215	58,391	12.77
17. Southern Colorado	90	2,223,639	748,503	101,870	3,074,012	6.22	2,033	174	352,878	8.71
18. New Mexico	18	44,502	43,627	45	88,174	5.80	107	169	18,130	4.86
19. Wyoming	19	1,348,729	582,546	92,921	2,024,196	3.45	597	142	84,592	23.93
20. Utah	45	4,490,420	444,251	20,022	4,954,693	6.35	2,418	191	462,802	10.71
21. North-South Dakota	33	1,861,796	488,162	195,445	2,545,403	2.31	352	200	70,399	36.16
22. Montana	19	245,637	65,718	2,068	313,423	3.79	145	166	24,083	13.01
23. Washington	18	871,617	71,739	7,260	950,616	8.46	412	216	88,937	10.69
Total	7,865	350,649,243	52,699,165	12,163,939	415,512,347	4.69	169,400	191	32,384,964	12.83

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, all other uses at mine, taken by locomotive tender, and transported from mine to point of use by conveyor, tram, or pipeline.

[3] Value received or charged for coal, f.o.b. mines. Includes a value, estimated by producer, for coal not sold.

NUMBER AND SIZE OF MINES

The unit in the statistical record is the mine, and operating companies are requested to make a separate report for each mine because its location is definitely known and can be related to a specific district or county; its identity can be followed through successive changes of ownership; and it is the natural operating unit from the standpoint of cost, mechanical equipment, mining practice, and output per man per day. See figure 6.

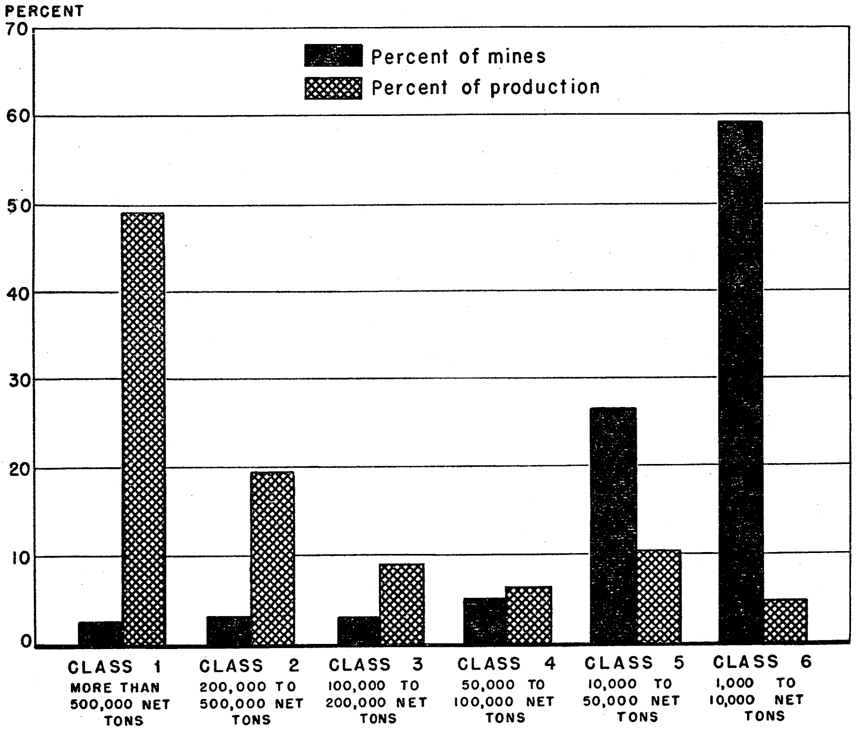

FIGURE 6.—Percentage of number of mines and of production of bituminous coal and lignite mines in the United States, 1960, by size of output.

TABLE 14.—Number and production of bituminous coal and lignite mines in the United States, 1960, by States and size of output

State	Class 1—500,000 tons and over				Class 2—200,000 to 500,000 tons				Class 3—100,000 to 200,000 tons			
	Mines		Production		Mines		Production		Mines		Production	
	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage
Alabama	6	3.4	6,591,677	50.7	9	5.1	2,836,602	21.8	15	8.5	2,015,059	15.5
Alaska					1	12.5	207,036	28.7	2	25.0	290,098	40.2
Arizona												
Arkansas									1	5.0	117,127	28.6
Colorado					5	5.3	1,432,078	39.7	7	7.5	977,938	27.1
Georgia												
Illinois	35	27.3	39,198,705	85.2	12	9.4	3,872,326	8.4	12	9.4	1,689,857	3.7
Indiana	11	13.6	10,783,720	69.4	10	12.3	3,455,632	22.2	2	2.5	326,370	2.1
Iowa									2	4.5	318,789	29.9
Kansas	1	7.7	549,056	61.8	1	7.7	236,753	26.6				
Kentucky	32	1.7	32,493,774	48.6	36	1.9	11,148,551	16.7	32	1.7	4,611,745	6.9
Maryland									1	1.2	109,232	14.6
Missouri	3	9.1	2,023,030	70.0	1	3.0	281,518	9.8	3	9.1	369,538	12.8
Montana (bituminous and lignite)									1	5.3	186,786	59.6
New Mexico					1	5.3	203,489	69.0				
North Dakota (lignite)	1	3.1	601,570	23.8	4	12.5	1,265,682	50.2	2	6.3	338,178	13.4
Ohio	14	3.0	16,235,316	47.8	13	2.8	4,217,314	12.4	36	7.6	5,213,146	15.3
Oklahoma					1	3.9	203,278	15.2	4	15.4	618,055	46.1
Pennsylvania	29	2.3	29,085,305	44.5	39	3.0	11,842,395	18.1	55	4.3	7,560,960	11.6
South Dakota (lignite)												
Tennessee					4	1.0	1,275,358	21.5	5	1.2	652,888	11.0
Utah	1	2.2	541,613	10.9	9	20.0	3,077,788	62.1	3	6.7	418,933	8.5
Virginia	3	.2	6,940,644	24.9	15	1.2	4,727,263	17.0	8	.6	1,091,179	3.9
Washington									1	10.0	123,974	54.3
West Virginia	65	3.8	59,433,922	50.0	95	5.6	29,903,564	25.1	68	4.0	9,843,925	8.3
Wyoming	1	5.3	520,233	25.7	2	10.5	826,701	40.8	2	10.5	330,157	16.3
Total	202	2.6	204,998,565	49.3	258	3.3	81,013,328	19.5	262	3.3	37,203,934	9.0

TABLE 14.—Number and production of bituminous coal and lignite mines in the United States, 1960, by States and size of output—Con.

State	Class 4—50,000 to 100,000 tons				Class 5—10,000 to 50,000 tons				Class 6—less than 10,000 tons				Total		
	Mines		Production		Mines		Production		Mines		Production		Mines	Production (net tons)	
	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage		Total	Average per mine
Alabama	8	4.5	497,002	3.8	32	18.1	651,700	5.0	107	60.4	418,607	3.2	177	13,010,647	73,506
Alaska	3	37.5	213,999	29.6	1	12.5	10,243	1.4	1	12.5	1,095	.1	8	722,471	90,309
Arizona									2	100.0	5,526	100.0	2	5,526	2,763
Arkansas	1	5.0	63,794	15.6	10	50.0	211,501	51.7	8	40.0	16,777	4.1	20	409,199	20,460
Colorado	8	8.5	549,850	15.2	24	25.5	465,379	12.9	50	53.2	182,041	5.1	94	3,607,286	38,375
Georgia									2	100.0	4,215	100.0	2	4,215	2,108
Illinois	7	5.5	446,035	1.0	31	24.2	652,736	1.4	31	24.2	117,827	.3	128	45,977,486	359,199
Indiana	6	7.4	404,147	2.6	22	27.2	444,083	2.9	30	37.0	123,917	.8	81	15,537,869	191,826
Iowa	5	11.4	348,683	32.6	13	29.5	290,453	27.2	24	54.6	110,099	10.3	44	1,068,024	24,273
Kansas					3	23.1	77,106	8.7	8	61.5	25,359	2.9	13	888,274	68,329
Kentucky	67	3.6	4,717,369	7.1	417	22.4	8,423,139	12.6	1,280	68.7	5,451,914	8.1	1,864	66,846,492	35,862
Maryland					26	30.6	449,751	60.1	58	68.2	188,851	25.3	85	747,834	8,798
Missouri					7	21.2	160,110	5.5	19	57.6	56,014	1.9	33	2,890,210	87,582
Montana (bituminous and lignite)	1	5.2	58,963	18.8					17	89.5	67,674	21.6	19	313,423	16,496
New Mexico					2	10.5	57,080	19.4	16	84.2	34,193	11.6	19	294,762	15,514
North Dakota (lignite)	1	3.1	60,980	2.4	9	28.1	189,807	7.5	15	46.9	68,738	2.7	32	2,524,955	78,905
Ohio	47	10.0	3,457,393	10.2	149	31.7	3,927,358	11.6	211	44.9	906,245	2.7	470	33,956,772	72,248
Oklahoma	3	11.5	248,522	18.5	9	34.6	244,186	18.2	9	34.6	27,492	2.0	26	1,341,533	51,597
Pennsylvania	101	7.9	7,160,821	10.9	309	24.1	7,002,255	10.7	749	58.4	2,773,529	4.2	1,282	65,425,265	51,034
South Dakota (lignite)					1	100.0	20,448	100.0					1	20,448	20,448
Tennessee	10	2.4	675,174	11.4	99	23.8	2,231,276	37.6	297	71.6	1,095,754	18.5	415	5,930,450	14,290
Utah	7	15.5	562,859	11.4	13	28.9	294,526	5.9	12	26.7	58,974	1.2	45	4,954,693	110,104
Virginia	31	2.5	2,136,755	7.7	463	36.5	8,134,211	29.2	748	59.0	4,807,843	17.3	1,268	27,837,895	21,954
Washington					4	40.0	76,114	33.4	5	50.0	28,057	12.3	10	228,145	22,815
West Virginia	86	5.0	6,059,076	5.1	454	26.6	10,131,485	8.5	940	55.0	3,572,305	3.0	1,708	118,944,277	69,640
Wyoming	4	21.1	232,957	11.5	4	21.0	92,761	4.6	6	31.6	21,387	1.1	19	2,024,196	106,537
Total	396	5.0	27,894,379	6.7	2,102	26.7	44,237,708	10.6	4,645	59.1	20,164,433	4.9	7,865	415,512,347	52,831

EMPLOYMENT AND PRODUCTIVITY

The bituminous coal and lignite industry has become highly mechanized in recent years. Mechanization has strongly affected production per man per day and the number of employees. In the past 20 years productivity has more than doubled, and the number of employees has declined more than 60 percent. See figure 7.

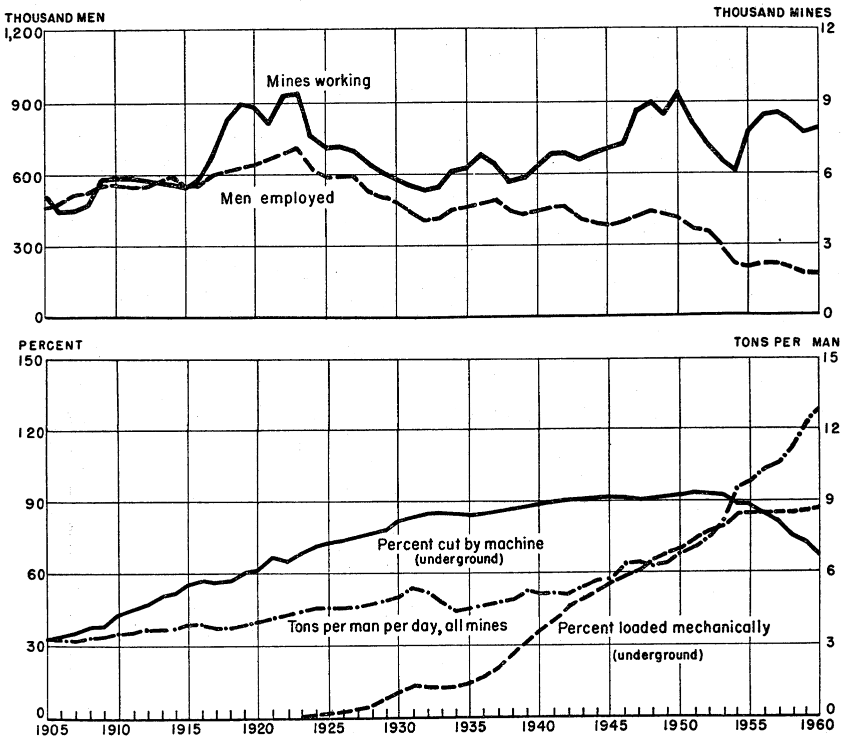

FIGURE 7.—Trends of employment, mechanization, and output per man at bituminous coal and lignite mines in the United States, 1905–60.

TABLE 15.—Production and average output per man per day of bituminous coal and lignite mines in the United States, 1960, by States and by underground, strip, and auger mining

State	Production (net tons)				Percentage of total production				Average tons per man per day			
	Underground	Strip	Auger	Total	Underground	Strip	Auger	Total	Underground	Strip	Auger	Total
Alabama	10,365,340	2,558,414	86,893	13,010,647	79.7	19.6	0.7	100.0	7.80	14.96	26.32	8.66
Alaska	66,982	655,489		722,471	9.3	90.7		100.0	6.01	15.43		13.47
Arizona	5,526			5,526	100.0			100.0	2.02			2.02
Arkansas	112,774	296,425		409,199	27.6	72.4		100.0	4.24	13.38		8.39
Colorado	2,914,437	692,849		3,607,286	80.8	19.2		100.0	8.06	28.46		9.34
Georgia	4,215			4,215	100.0			100.0	1.84			1.84
Illinois	23,306,901	22,670,585		45,977,486	50.7	49.3		100.0	17.38	30.04		21.94
Indiana	4,752,902	10,784,967		15,537,869	30.6	69.4		100.0	11.96	29.50		20.36
Iowa	200,100	867,924		1,068,024	18.7	81.3		100.0	4.51	18.15		11.58
Kansas	3,584	884,690		888,274	.4	99.6		100.0	2.41	17.11		16.70
Kentucky	44,468,474	19,672,192	2,705,826	66,846,492	66.5	29.4	4.1	100.0	10.61	36.16	30.03	13.86
Maryland	260,198	487,636		747,834	34.8	65.2		100.0	4.37	15.51		8.22
Missouri	88,273	2,801,937		2,890,210	3.1	96.9		100.0	3.06	11.83		10.88
Montana:												
Bituminous	104,727	8,031		112,758	92.9	7.1		100.0	6.11	4.78		5.99
Lignite	11,266	189,399		200,665	5.6	94.4		100.0	6.80	52.51		38.13
Total Montana	115,993	197,430		313,423	37.0	63.0		100.0	6.17	37.34		13.01
New Mexico	249,762	45,000		294,762	84.7	15.3		100.0	6.32	45.00		7.27
North Dakota (lignite)	2,403	2,522,552		2,524,955	.1	99.9		100.0	7.30	37.07		36.93
Ohio	9,206,400	23,883,289	867,083	33,956,772	27.1	70.3	2.6	100.0	10.95	23.59	42.45	18.13
Oklahoma	247,568	1,093,965		1,341,533	18.5	81.5		100.0	3.10	16.34		9.14
Pennsylvania	44,070,560	20,875,533	479,172	65,425,265	67.4	31.9	.7	100.0	9.04	17.03	18.53	10.68
South Dakota (lignite)		20,448		20,448		100.0		100.0		10.10		10.10
Tennessee	3,938,626	1,763,913	227,911	5,930,450	66.4	29.8	3.8	100.0	6.70	20.97	25.93	8.71
Utah	4,954,693			4,954,693	100.0			100.0	10.71			10.71
Virginia	25,819,830	1,370,864	647,201	27,837,895	92.8	4.9	2.3	100.0	9.44	26.77	33.04	9.92
Washington	211,968	16,177		228,145	92.9	7.1		100.0	6.30	9.77		6.46
West Virginia	109,209,989	6,754,001	2,980,287	118,944,277	91.8	5.7	2.5	100.0	11.78	13.65	34.30	12.07
Wyoming	310,812	1,713,384		2,024,196	15.4	84.6		100.0	7.60	39.20		23.93
Total	284,888,310	122,629,664	7,994,373	415,512,347	68.6	29.5	1 9	100.0	10.64	22.93	31.36	12.83

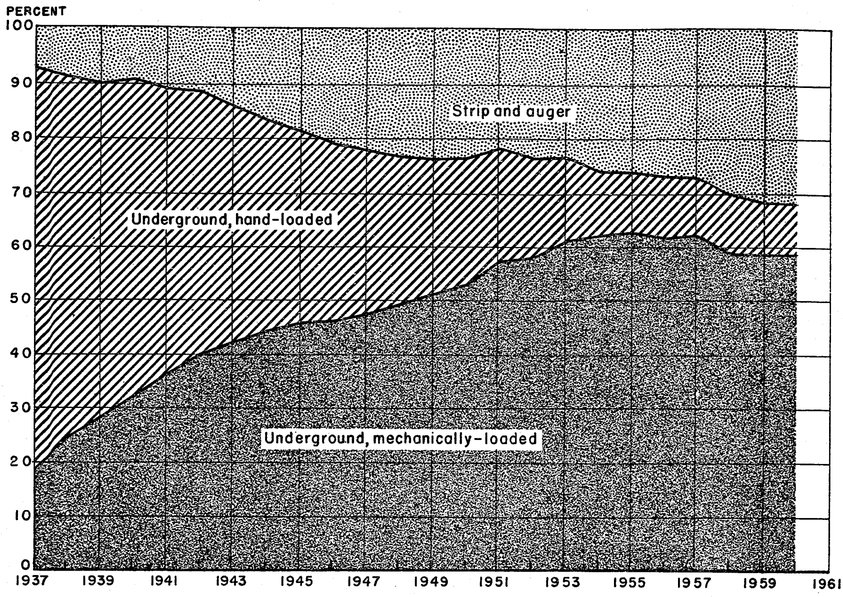

FIGURE 8.—Percentage of total production of bituminous coal and lignite in the United States, 1937–60, by type of mining and loading.

UNDERGROUND MINING

Three-fourths of the output of bituminous coal and lignite is mined underground. The major tasks underground are cutting, drilling shotholes, loading, and haulage. Loading is discussed later in the section on Mechanical Loading. For many years most of the underground production has been cut by machine; however, as the percentage of production by continuous mining machines increases, the percentage cut by machines will decrease. The use of power drills for shotholes increased rapidly from less than 50 percent of the underground production in 1940 to a maximum of 84 percent in 1953. The use of continuous mining machines decreased the tonnage power-drilled for shotholes to 68 percent of the underground output. Trolley locomotives are the principal method of underground haulage; however, in recent years the use of conveyor haulage has increased steadily.

The number and capacity of mine cars and the miles of rail track at underground mines are included for 1960 for the first time. Mines producing 65 percent of the underground output reported 129,346 mine cars and 3,977 miles of rail track. Mines not reporting mine cars or track produced 19 percent, and mines employing 100-percent conveyor haulage furnished the remaining 16 percent of the underground production. Usually mine cars were of 3-ton capacity, and the greatest volume of tonnage was hauled in 4- to 5-ton-capacity cars. However, 7 percent of all mine cars were large, 10 tons and over, and hauled 19 percent of all tonnage.

TABLE 16.—Number of mines, production, men working daily, days active, man-days, and output per man per day at underground bituminous coal and lignite mines in the United States, 1960, by States

State	Number of active mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama	135	10,365,340	6,399	208	1,328,391	7.80
Alaska	2	66,982	51	219	11,145	6.01
Arizona	2	5,526	18	152	2,730	2.02
Arkansas	10	112,774	289	92	26,608	4.24
Colorado	87	2,914,437	2,037	178	361,792	8.06
Georgia	2	4,215	12	191	2,291	1.84
Illinois	59	23,306,901	6,600	203	1,341,051	17.38
Indiana	34	4,752,902	2,051	194	397,456	11.96
Iowa	19	200,100	256	173	44,398	4.51
Kansas	2	3,584	24	62	1,490	2.41
Kentucky	1,630	44,468,474	24,241	173	4,189,302	10.61
Maryland	48	260,198	416	143	59,580	4.37
Missouri	10	88,273	170	169	28,803	3.06
Montana:						
Bituminous	11	104,727	104	165	17,140	6.11
Lignite	3	11,266	14	118	1,656	6.80
Total Montana	14	115,993	118	159	18,796	6.17
New Mexico	18	249,762	219	181	39,532	6.32
North Dakota (lignite)	1	2,403	3	110	329	7.30
Ohio	149	9,206,400	4,250	198	840,581	10.95
Oklahoma	11	247,568	447	179	79,906	3.10
Pennsylvania	680	44,070,560	26,890	181	4,874,276	9.04
Tennessee	332	3,938,626	3,807	154	587,940	6.70
Utah	45	4,954,693	2,418	191	462,802	10.71
Virginia	1,201	25,819,830	13,193	207	2,734,248	9.44
Washington	9	211,968	192	175	33,655	6.30
West Virginia	1,479	109,209,989	47,623	195	9,273,058	11.78
Wyoming	10	310,812	369	111	40,878	7.60
Total	5,989	284,888,310	142,093	188	26,781,038	10.64

TABLE 17.—Underground production of bituminous coal and lignite in the United States, 1960, by States and mining methods

State	Cut by hand and shot from solid		Cut by machines				Mined by continuous mining machines		Total underground (net tons)
	Net tons	Percentage of total underground	Net tons	Percentage of total underground	Number of coal-cutting machines	Average output per machine (net tons)	Net tons	Percentage of total underground	
Alabama	288,541	2.8	9,247,297	89.2	237	39,018	829,502	8.0	10,365,340
Alaska	66,982	100.0							66,982
Arizona	1,531	27.7	3,995	72.3	1	3,995			5,526
Arkansas			99,666	88.4	35	2,848	13,108	11.6	112,774
Colorado	458,259	15.7	1,415,945	48.6	185	7,654	1,040,233	35.7	2,914,437
Georgia	4,215	100.0							4,215
Illinois	13,801	.1	16,340,687	70.1	128	127,662	6,952,413	29.8	23,306,901
Indiana	3,500	.1	4,033,195	84.8	74	54,503	716,207	15.1	4,752,902
Iowa	44,585	22.3	155,515	77.7	17	9,147			200,100
Kansas			3,584	100.0	3	1,195			3,584
Kentucky	3,693,765	8.3	36,913,117	83.0	1,183	31,203	3,861,592	8.7	44,468,474
Maryland	67,000	25.7	193,198	74.3	41	4,712			260,198
Missouri			88,273	100.0	13	6,790			88,273
Montana:									
Bituminous			104,727	100.0	20	5,236			104,727
Lignite	9,233	82.0	2,033	18.0	2	1,017			11,266
Total	9,233	8.0	106,760	92.0	22	4,853			115,993
New Mexico	24,811	9.9	21,462	8.6	12	1,789	203,489	81.5	249,762
North Dakota (lignite)	2,403	100.0							2,403
Ohio	27,698	.3	6,193,913	67.3	232	26,698	2,984,789	32.4	9,206,400
Oklahoma	3,766	1.5	243,802	98.5	55	4,433			247,568
Pennsylvania	860,114	1.9	16,198,079	36.8	1,033	15,681	27,012,367	61.3	44,070,560
Tennessee	643,574	16.3	3,178,455	80.7	205	15,505	116,597	3.0	3,938,626
Utah	1,035	.1	3,473,950	70.0	112	31,017	1,479,708	29.9	4,954,693
Virginia	4,463,779	17.3	20,330,604	78.7	955	21,289	1,025,447	4.0	25,819,830
Washington	112,715	53.2					99,253	46.8	211,968
West Virginia	3,033,805	2.8	74,619,715	68.3	1,865	40,011	31,556,469	28.9	109,209,989
Wyoming			273,706	88.1	32	8,553	37,106	11.9	310,812
Total	13,825,112	4.8	193,134,918	67.8	6,440	29,990	77,928,280	27.4	284,888,310

TABLE 18.—Summary of drilling operations at underground bituminous coal and lignite mines in the United States

Year	Number of mines using power drills	Number of power drills[1]					Production (thousand net tons)—				Production, percent—		
		Electric	Face or coal	Compressed air	Roof or rock	Total	Where shotholes are power-drilled	Where shotholes are hand-drilled	Where no shotholes are required (continuous mining)	Total	Where shotholes are power-drilled	Where shotholes are hand-drilled	Where no shotholes are required (continuous mining)
1936	599	3,968		1,302		5,270	111,950	299,012		410,962	27.2	72.8	
1937	(2)	(2)		(2)		(2)	(2)	(2)		413,780	(2)	(2)	
1938	1,061	5,071		1,465		6,536	122,581	195,557		318,138	38.5	61.5	
1939	(2)	(2)		(2)		(2)	(2)	(2)		357,133	(2)	(2)	
1940	1,172	6,613		1,378		7,991	197,083	220,521		417,604	47.2	52.8	
1941	1,266	7,697		1,502		9,199	237,213	221,865		459,078	51.7	48.3	
1942	1,364	8,482		1,564		10,046	281,530	233,960		515,490	54.6	45.4	
1943	1,376	8,930		1,630		10,560	299,805	210,687		510,492	58.7	41.3	
1944	1,501	9,755		1,903		11,658	324,116	194,562		518,678	62.5	37.5	
1945	1,504	10,267		1,855		12,122	302,786	164,844		467,630	64.7	35.3	
1946	1,702	10,968		1,884		12,852	278,734	142,224		420,958	66.2	33.8	
1947	2,522	12,940		1,449		14,389	351,866	139,363		491,229	71.6	28.4	
1948	2,798	13,970		1,312		15,282	336,873	122,689	450	460,012	73.2	26.7	0.1
1949	2,923	14,087		1,411		15,498	251,329	77,894	2,600	331,823	75.7	23.5	.8
1950	3,112	14,277		1,282		15,559	286,661	101,333	4,850	392,844	73.0	25.8	1.2
1951	3,027	14,231		1,345		15,576	324,645	85,136	6,061	415,842	78.0	20.5	1.5
1952	2,830	13,468		1,292		14,760	284,048	64,162	8,215	356,425	79.7	18.0	2.3
1953	2,486	12,054		1,053		13,107	293,161	44,560	11,830	349,551	83.9	12.7	3.4
1954	2,137	10,782		885		11,667	233,557	39,219	16,336	289,112	80.7	13.6	5.7
1955	2,003	9,533		476		10,009	285,348	30,657	27,460	343,465	83.1	8.9	8.0
1956	4,033	(1)	11,021	(1)	2,443	13,464	306,675	19,192	39,907	365,774	83.8	5.3	10.9
1957	4,152	(1)	10,938	(1)	2,981	13,919	294,186	12,680	53,783	360,649	81.6	3.5	14.9
1958	4,410	(1)	9,691	(1)	2,947	12,638	216,226	14,285	56,373	286,884	75.4	5.0	19.6
1959	3,979	(1)	8,524	(1)	2,814	11,338	207,043	10,599	65,792	283,434	73.1	3.7	23.2
1960	4,294	(1)	8,265	(1)	2,840	11,105	194,956	12,004	77,928	284,888	68.4	4.2	27.4

[1] Total number of power drills prior to 1956 are not strictly comparable with the figures for 1956 to date. Data was collected by "type" of drills prior to 1956 and by "use" of drills 1956 to date. Most of the "electric" drills were used in coal and most of the "compressed air" drills were used in rock. "Face or coal" drills include handheld, post-mounted, and mobile drills. "Roof or rock" drills include rotary and percussion drills.

[2] Data not available.

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TABLE 19.—Use of power drills in underground bituminous coal and lignite mines in the United States, in 1960, by States

State	Number of mines using power drills	Number of power drills						Production where shotholes are power-drilled (net tons)			
		Face or coal drills		Roof or rock drills				Hand-held and post-mounted drills	Mobile drills	Total	Percentage of total underground
		Hand-held and post-mounted	Mobile	Roof bolting		Other uses					
				Rotary	Percussion	Rotary	Percussion				
Alabama	79	236	14	40	90	18	19	8,237,699	1,074,429	9,312,128	89.8
Alaska	1	18	-	-	-	-	-	65,887	-	65,887	98.4
Arizona	1	1	-	-	-	-	-	3,995	-	3,995	72.3
Arkansas	6	16	-	-	1	-	-	95,098	-	95,098	84.3
Colorado	77	236	5	4	80	1	2	1,471,625	168,203	1,639,828	56.3
Illinois	58	52	113	128	-	8	1	1,112,666	15,279,816	16,392,482	70.3
Indiana	34	36	37	31	3	1	1	414,134	3,622,561	4,036,695	84.9
Iowa	14	22	1	2	-	-	-	145,514	33,690	179,204	89.6
Kansas	1	1	-	-	-	-	-	1,084	-	1,084	30.2
Kentucky	1,040	1,552	120	241	107	12	31	23,891,736	11,639,790	35,531,526	79.9
Maryland	29	43	-	-	-	-	1	210,504	-	210,504	80.9
Missouri	8	6	-	3	1	-	-	71,879	-	71,879	81.4
Montana:											
Bituminous	11	21	1	2	-	-	-	98,368	6,359	104,727	100.0
Lignite	3	8	-	-	-	-	-	11,266	-	11,266	100.0
Total Montana	14	29	1	2	-	-	-	109,634	6,359	115,993	100.0
New Mexico	11	17	-	1	4	-	-	36,912	-	36,912	14.8
North Dakota (lignite)	1	1	-	-	-	-	-	2,403	-	2,403	100.0
Ohio	127	230	39	68	5	-	-	3,556,355	2,575,213	6,131,568	66.6
Oklahoma	6	49	-	-	-	-	-	237,296	-	237,296	95.9
Pennsylvania	366	805	118	295	409	39	136	10,207,923	5,352,832	15,560,755	35.3
Tennessee	159	302	-	10	6	1	1	3,343,869	-	3,343,869	84.9
Utah	42	58	90	8	111	1	43	533,954	2,908,111	3,442,065	69.5
Virginia	1,197	1,343	20	40	29	3	45	18,668,997	4,739,273	23,408,270	90.7
Washington	7	46	-	-	-	-	-	111,637	-	111,637	52.7
West Virginia	1,010	2,420	147	682	425	21	58	60,607,129	14,146,800	74,753,929	68.4
Wyoming	6	41	-	14	-	-	-	271,189	-	271,189	87.3
Total	4,294	7,560	705	1,569	1,271	105	338	133,409,119	61,547,077	194,956,196	68.4

TABLE 20.—Number of underground bituminous coal and lignite mines and number of haulage units in use in the United States, in selected years [1]

Year	Underground mines	Locomotives				Rope-haulage units			Shuttle cars			Gathering and haulage conveyors	Animals
		Trolley	Battery	Other types	Total	Portable	Stationary	Total	Cable reel	Battery	Total		
1924	7,352	[2] 12,765	1,515	443	14,723	(3)	(3)	649	(3)	(3)	(3)	(3)	36,352
1946	5,888	14,110	1,011	110	15,231	4,084	1,009	5,093	(3)	(3)	(3)	457	10,185
1948	7,108	14,617	904	74	15,595	3,886	1,044	4,930	(3)	(3)	(3)	755	10,834
1949	6,798	14,090	928	59	15,077	3,904	1,073	4,977	2,144	623	2,767	860	10,313
1950	7,559	13,822	949	62	14,833	4,225	1,037	5,262	2,782	512	3,294	1,013	10,033
1951	6,225	13,327	900	51	14,278	3,875	916	4,791	3,191	567	3,758	1,094	7,478
1952	5,632	12,545	812	41	13,398	3,584	852	4,436	3,382	462	3,844	1,066	6,555
1953	5,034	11,311	678	45	12,034	2,838	727	3,565	3,797	425	4,222	1,042	5,354
1954	4,653	10,155	762	38	10,955	1,926	781	2,707	4,400	431	4,831	1,081	5,409
1955	6,035	9,538	658	40	10,236	1,327	577	1,904	[4] 4,375	[4] 239	[4] 4,614	1,002	6,440
1956	6,542	9,445	861	102	10,408	1,420	575	1,995	[4] 4,757	[4] 257	[4] 5,014	1,114	6,097
1957	6,512	8,997	898	138	10,033	1,214	616	1,830	[4] 5,129	[4] 257	[4] 5,386	1,233	5,054
1958	6,319	8,057	920	138	9,115	926	538	1,464	[4] 4,871	[4] 259	[4] 5,130	1,235	4,678
1959	5,815	7,263	949	137	8,349	900	504	1,404	[4] 4,795	[4] 255	[4] 5,050	1,416	4,063
1960	5,989	6,922	946	173	8,041	892	510	1,402	4,722	236	4,958	1,566	3,503

[1] Exclusive of lignite and Virginia semianthracite mines in 1946, 1948, and 1949.
[2] Includes combination trolley and battery locomotives.
[3] Data not available.
[4] Revised. Number of shuttle cars reduced due to producers in Kentucky reporting "shuttle buggies" as shuttle cars.

TABLE 21.—Haulage units and length of rail track and gathering and haulage conveyors in use in the bituminous coal and lignite underground mines in the United States, 1960, by States

State	Animals	Locomotives			Mine cars [1]	Rail track (miles) [1]	Shuttle cars		Rope hoists		Gathering and haulage conveyors	
		Trolley	Battery	All others			Cable reel	Battery	Portable	Stationary	Units	Miles
Alabama	107	297			5,006	164.0	220	2	11	12	58	22.0
Alaska		2	2		6	.1		1			1	.3
Arizona	3											
Arkansas	5	3	4		123	1.7			2	11	3	.6
Colorado	43	86	52	1	3,062	51.4	73	25	36	33	20	5.4
Georgia	2											
Illinois	32	240	31		4,054	119.5	297	3		19	128	50.9
Indiana	25	105	3	1	1,234	38.6	96		2	14	21	4.4
Iowa	41	4	2		523	5.8	4			14		
Kansas	3											
Kentucky	1,151	990	119	15	11,848	507.8	675	35	79	59	170	49.5
Maryland	79	7	4		206	9.5	1			11		
Missouri	21		2		186	3.2				1		
Montana:												
Bituminous	3	15	1		81	7.6	6		3	8		
Lignite	5				23							
Total Montana	8	15	1		104	7.6	6		3	8		
New Mexico	16	10	2		257	9.6	6		8	8	1	.1
North Dakota (lignite)	1											
Ohio	60	219	28	7	3,814	133.6	102		18	27	33	11.5
Oklahoma	2	4	6		9	.4	4			5		
Pennsylvania	439	1,895	120	31	41,227	1,196.6	981	42	478	145	322	96.6
Tennessee	258	92	17	2	1,059	43.2	48		4	6	21	5.6
Utah	8	132	28	1	3,244	99.8	190	7	2	18	48	13.9
Virginia	489	657	367	38	6,233	273.4	238	3	57	7	59	24.8
Washington	4	18			67	2.4			8	10	3	1.1
West Virginia	705	2,136	154	77	46,640	1,287.3	1,760	118	184	96	675	211.6
Wyoming	1	10	4		444	21.2	21			6	3	.9
Total	3,503	6,922	946	173	129,346	3,976.7	4,722	236	892	510	1,566	499.2

[1] See table 22 for percentage coverage.

TABLE 22.—Method of haulage and miles of track at bituminous coal and lignite underground mines in the United States, 1960, by States

State	Production (net tons) from mines—				Percentage of total underground production, from mines—				Rail track reported (miles)		
	Reporting mine cars and track	With conveyor haulage only	Not reporting mine cars and track	Total	Reporting mine cars and track	With conveyor haulage only	Not reporting mine cars and track	Total	Main line	All other	Total
Alabama	7,055,980	2,511,570	797,790	10,365,340	68.1	24.2	7.7	100.0	124.2	39.8	164.0
Alaska	1,095	65,887	-----	66,982	1.6	98.4	-----	100.0	.1	-----	.1
Arkansas	39,613	33,253	39,908	112,774	35.1	29.5	35.4	100.0	1.7	-----	1.7
Colorado	1,591,757	858,417	464,263	2,914,437	54.6	29.5	15.9	100.0	32.5	18.9	51.4
Illinois	9,788,899	12,199,682	1,318,320	23,306,901	42.0	52.3	5.7	100.0	93.9	25.6	119.5
Indiana	3,591,615	663,363	497,924	4,752,902	75.5	14.0	10.5	100.0	29.9	8.7	38.6
Iowa	171,426	-----	28,674	200,100	85.7	-----	14.3	100.0	5.2	.6	5.8
Kentucky	22,026,690	7,262,096	15,179,688	44,468,474	49.5	16.3	34.2	100.0	362.9	144.9	507.8
Maryland	67,263	-----	192,935	260,198	25.9	-----	74.1	100.0	6.7	2.8	9.5
Missouri	49,997	-----	38,276	88,273	56.6	-----	43.4	100.0	2.0	1.2	3.2
Montana:											
Bituminous	89,661	-----	15,066	104,727	85.6	-----	14.4	100.0	5.1	2.5	7.6
Lignite	6,473	-----	4,793	11,266	57.5	-----	42.5	100.0	-----	-----	-----
Total Montana	96,134	-----	19,859	115,993	82.9	-----	17.1	100.0	5.1	2.5	7.6
New Mexico	229,684	-----	20,078	249,762	92.0	-----	8.0	100.0	7.2	2.4	9.6
Ohio	7,945,701	792,581	468,118	9,206,400	86.3	8.6	5.1	100.0	95.1	38.5	133.6
Oklahoma	1,417	-----	246,151	247,568	.6	-----	99.4	100.0	.3	.1	.4
Pennsylvania	39,875,592	1,712,131	2,482,837	44,070,560	90.5	3.9	5.6	100.0	781.0	415.6	1,196.6
Tennessee	1,620,799	20,209	2,297,618	3,938,626	41.2	.5	58.3	100.0	36.5	6.7	43.2
Utah	4,006,956	-----	947,737	4,954,693	80.9	-----	19.1	100.0	70.1	29.7	99.8
Virginia	9,266,713	6,016,969	10,536,148	25,819,830	35.9	23.3	40.8	100.0	213.4	60.0	273.4
Washington	66,758	7,839	137,371	211,968	31.5	3.7	64.8	100.0	2.0	.4	2.4
West Virginia	76,314,308	12,927,991	19,967,690	109,209,989	69.9	11.8	18.3	100.0	935.0	352.3	1,287.3
Wyoming	171,386	53,728	85,698	310,812	55.1	17.3	27.6	100.0	11.7	9.5	21.2
Other States [1]	-----	-----	15,728	15,728	-----	-----	100.0	100.0	[2]	[2]	[2]
Total	183,979,783	45,125,716	55,782,811	284,888,310	64.6	15.8	19.6	100.0	2,816.5	1,160.2	3,976.7

[1] Includes Arizona, Georgia, Kansas, and North Dakota (lignite).
[2] Data not available.

TABLE 23.—Mine cars used at bituminous coal and lignite underground mines in the United States, 1960, by States [1]

State	Capacity						
	1 ton	2 tons	3 tons	4–5 tons	6–9 tons	10 tons and over	Total
NUMBER REPORTED							
Alabama	134	128	816	1,192	2,736	-------	5,006
Alaska	-------	-------	-------	6	-------	-------	6
Arkansas	-------	73	50	-------	-------	-------	123
Colorado	750	2,005	193	102	-------	12	3,062
Illinois	665	1,393	92	763	993	148	4,054
Indiana	50	187	113	464	420	-------	1,234
Iowa	342	181	-------	-------	-------	-------	523
Kentucky	505	3,711	2,633	2,777	709	1,513	11,848
Maryland	127	79	-------	-------	-------	-------	206
Missouri	186	-------	-------	-------	-------	-------	186
Montana:							
Bituminous	-------	40	26	15	-------	-------	81
Lignite	20	3	-------	-------	-------	-------	23
Total Montana	20	43	26	15	-------	-------	104
New Mexico	90	70	-------	-------	97	-------	257
Ohio	917	1,055	364	26	1,079	373	3,814
Oklahoma	-------	9	-------	-------	-------	-------	9
Pennsylvania	5,324	7,074	9,790	5,847	10,227	2,965	41,227
Tennessee	396	277	43	263	80	-------	1,059
Utah	1	21	314	2,037	871	-------	3,244
Virginia	1,244	1,391	1,072	2,213	36	277	6,233
Washington	26	15	-------	26	-------	-------	67
West Virginia	573	3,470	11,207	22,515	4,749	4,126	46,640
Wyoming	-------	-------	-------	444	-------	-------	444
Total	11,350	21,182	26,713	38,690	21,997	9,414	129,346
PERCENTAGE OF TOTAL							
Alabama	2.7	2.6	16.3	23.7	54.7	-------	100.0
Alaska	-------	-------	-------	100.0	-------	-------	100.0
Arkansas	-------	59.3	40.7	-------	-------	-------	100.0
Colorado	24.5	65.5	6.3	3.3	-------	0.4	100.0
Illinois	16.4	34.4	2.3	18.8	24.5	3.6	100.0
Indiana	4.0	15.2	9.2	37.6	34.0	-------	100.0
Iowa	65.4	34.6	-------	-------	-------	-------	100.0
Kentucky	4.3	31.3	22.2	23.4	6.0	12.8	100.0
Maryland	61.7	38.3	-------	-------	-------	-------	100.0
Missouri	100.0	-------	-------	-------	-------	-------	100.0
Montana:							
Bituminous	-------	49.4	32.1	18.5	-------	-------	100.0
Lignite	87.0	13.0	-------	-------	-------	-------	100.0
Total Montana	19.2	41.4	25.0	14.4	-------	-------	100.0
New Mexico	35.0	27.2	-------	-------	37.8	-------	100.0
Ohio	24.0	27.7	9.5	.7	28.3	9.8	100.0
Oklahoma	-------	100.0	-------	-------	-------	-------	100.0
Pennsylvania	12.9	17.2	23.7	14.2	24.8	7.2	100.0
Tennessee	37.4	26.2	4.1	24.8	7.5	-------	100.0
Utah	-------	.6	9.7	62.8	26.9	-------	100.0
Virginia	20.0	22.3	17.2	35.5	.6	4.4	100.0
Washington	38.8	22.4	-------	38.8	-------	-------	100.0
West Virginia	1.2	7.4	24.0	48.3	10.2	8.9	100.0
Wyoming	-------	-------	-------	100.0	-------	-------	100.0
Total	8.8	16.3	20.7	29.9	17.0	7.3	100.0

[1] See table 22 for percentage coverage.

TABLE 24.—Mine-car haulage at bituminous coal and lignite underground mines, in the United States, 1960, by States [1]

State		Production, by size of mine car reported					
		1 ton	2 tons	3 tons	4-5 tons	6-9 tons	10 tons and over	Total
Alabama	net tons	63,417	71,951	658,619	2,329,763	3,932,230		7,055,980
Alaska	do				1,095			1,095
Arkansas	do		15,711	23,902				39,613
Colorado	do	275,852	1,027,246	25,699	209,194		53,766	1,591,757
Illinois	do	188,947	655,576	130,792	1,474,704	5,192,147	2,146,733	9,788,899
Indiana	do	22,325	135,203	155,000	1,753,351	1,525,736		3,591,615
Iowa	do	82,065	89,361					171,426
Kentucky	do	450,039	4,299,090	3,064,439	5,970,823	2,636,788	5,605,511	22,026,690
Maryland	do	51,722	15,541					67,263
Missouri	do	49,997						49,997
Montana:								
Bituminous	do		16,402	66,900	6,359			89,661
Lignite	do	4,440	2,033					6,473
Total Montana	do	4,440	18,435	66,900	6,359			96,134
New Mexico	do	25,101	1,094			203,489		229,684
Ohio	do	407,338	536,434	1,402,693	30,093	3,694,159	1,874,984	7,945,701
Oklahoma	do		1,417					1,417
Pennsylvania	do	1,613,618	2,668,302	5,183,804	4,841,069	17,485,155	8,083,644	39,875,592
Tennessee	do	221,324	220,904	73,914	886,959	217,608		1,620,799
Utah	do	1,035	20,082	173,691	2,483,764	1,328,384		4,006,956
Virginia	do	1,364,836	2,116,755	1,231,298	2,727,992	102,726	1,723,106	9,266,713
Washington	do	4,784	6,756		55,218			66,758
West Virginia	do	519,500	3,537,352	13,064,420	30,027,455	13,473,034	15,692,547	76,314,308
Wyoming	do				171,386			171,386
Total	do	5,346,340	15,437,300	25,255,171	52,969,225	49,791,456	35,180,291	183,979,783
Alabama	percentage of total	0.9	1.0	9.4	33.0	55.7		100.0
Alaska	do				100.0			100.0
Arkansas	do		39.7	60.3				100.0
Colorado	do	17.3	64.5	1.6	13.2		3.4	100.0
Illinois	do	1.9	6.7	1.3	15.1	53.1	21.9	100.0
Indiana	do	.6	3.8	4.3	48.8	42.5		100.0
Iowa	do	47.9	52.1					100.0
Kentucky	do	2.0	19.5	13.9	27.1	12.0	25.5	100.0
Maryland	do	76.9	23.1					100.0
Missouri	do	100.0						100.0

Montana:								
Bituminous	do		18.3	74.6	7.1			100.0
Lignite	do	68.6	31.4					100.0
Total Montana	do	4.6	19.2	69.6	6.6			100.0
New Mexico	do	10.9	.5			88.6		100.0
Ohio	do	5.1	6.7	17.7	.4	46.5	23.6	100.0
Oklahoma	do		100.0					100.0
Pennsylvania	do	4.1	6.7	13.0	12.1	43.8	20.3	100.0
Tennessee	do	13.7	13.7	4.6	54.6	13.4		100.0
Utah	do		.5	4.3	62.0	33.2		100.0
Virginia	do	14.7	22.9	13.3	29.4	1.1	18.6	100.0
Washington	do	7.2	10.1		82.7			100.0
West Virginia	do	.7	4.6	17.1	39.3	17.7	20.6	100.0
Wyoming	do				100.0			100.0
Total	do	2.9	8.4	13.7	28.8	27.1	19.1	100.0

[1] See table 22 for percentage coverage.

TABLE 25.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors and number and length of units in use in the United States [1]

Year	Number of mines	Production (net tons)	Number of units in use	Average length (feet)	Total length (miles)
1945	117	40,189,857	359	1,438	97.6
1946	161	46,022,710	457	1,484	128.5
1947	199	70,690,920	594	1,470	165.3
1948	270	81,821,361	755	1,460	208.8
1949	314	69,947,713	860	1,514	246.7
1950	374	92,413,644	1,013	1,538	294.9
1951	372	99,643,003	1,094	1,568	325.0
1952	358	92,168,992	1,066	1,526	308.2
1953	322	100,155,249	1,042	1,541	303.9
1954	291	83,211,284	1,081	1,626	332.9
1955	314	97,677,313	1,002	1,682	319.6
1956	314	126,717,518	1,114	1,656	349.4
1957	362	136,914,192	1,233	1,672	390.4
1958	366	115,419,740	1,235	1,711	400.3
1959	371	126,654,911	1,416	1,723	461.8
1960	396	137,053,564	1,566	1,673	499.2

[1] Includes all gathering and haulage conveyors with capacity over 500 feet, except main-slope conveyors. Excludes lignite and Virginia semianthracite mines in 1945–49.

TABLE 26.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors, and number and length of units in use in the United States, by States [1]

State	Number of mines		Production (net tons)		Number of units in use		Average length (feet)		Total length (miles)	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	8	7	3,768,239	4,362,743	46	58	1,723	2,000	15.0	22.0
Alaska	1	1	98,903	65,887	1	1	1,800	1,800	.3	.3
Arkansas	1	1	72,598	33,253	3	3	1,000	1,000	.6	.6
Colorado	5	6	758,121	869,229	19	20	1,458	1,438	5.2	5.4
Illinois	14	16	18,017,450	19,209,646	116	128	2,027	2,100	44.5	50.9
Indiana	4	5	1,217,241	2,854,437	14	21	1,314	1,103	3.5	4.4
Kentucky	42	45	17,647,067	18,128,500	180	170	1,574	1,537	53.7	49.5
New Mexico	------	1	------------	203,489	------	1	------	600	------	.1
Ohio	12	11	5,109,493	4,599,662	28	33	1,421	1,839	7.5	11.5
Pennsylvania	69	69	19,988,299	19,295,481	316	322	1,632	1,584	97.7	96.6
Tennessee	5	7	680,725	411,083	19	21	1,474	1,396	5.3	5.6
Utah	21	19	3,366,642	3,742,320	43	48	1,608	1,528	13.1	13.9
Virginia	10	14	2,698,616	7,562,294	47	59	1,989	2,218	17.7	24.8
Washington	1	1	24,283	7,839	2	3	3,500	2,000	1.3	1.1
West Virginia	174	192	53,078,838	55,653,973	575	675	1,791	1,655	195.0	211.6
Wyoming	4	1	128,396	53,728	7	3	1,043	1,500	1.4	.9
Total	371	396	126,654,911	137,053,564	1,416	1,566	1,723	1,673	461.8	499.2

[1] Includes all mines using belt conveyors, other than main-slope conveyors, 500 feet long or more for transporting coal underground.

STRIP MINING

Strip mines have two substantial advantages over underground mines: (1) The output per man per day in strip mines is more than double that in underground mines, and (2) the cost of strip coal, f.o.b. mines, averages about one-third less than coal from underground mines. See figures 9 and 10.

The rapid growth of strip mining was made possible by the development of larger and improved stripping and drilling equipment and trucks. The most notable recent change in stripping equipment has been replacement of virtually all steam shovels by diesel-powered and large electric shovels and draglines.

An increase in the average capacity of trucks used in strip mines has reduced the number required. The average hauling distance from strip mines to tipples or ramps is approximately 5 miles.

The average thickness of overburden at all bituminous coal and lignite strip mines in the United States was 42 feet in 1955, the latest year for which figures are available. Several strip mines handled an average of more than 60 feet of overburden in 1955, and a few handled more than 70 feet.

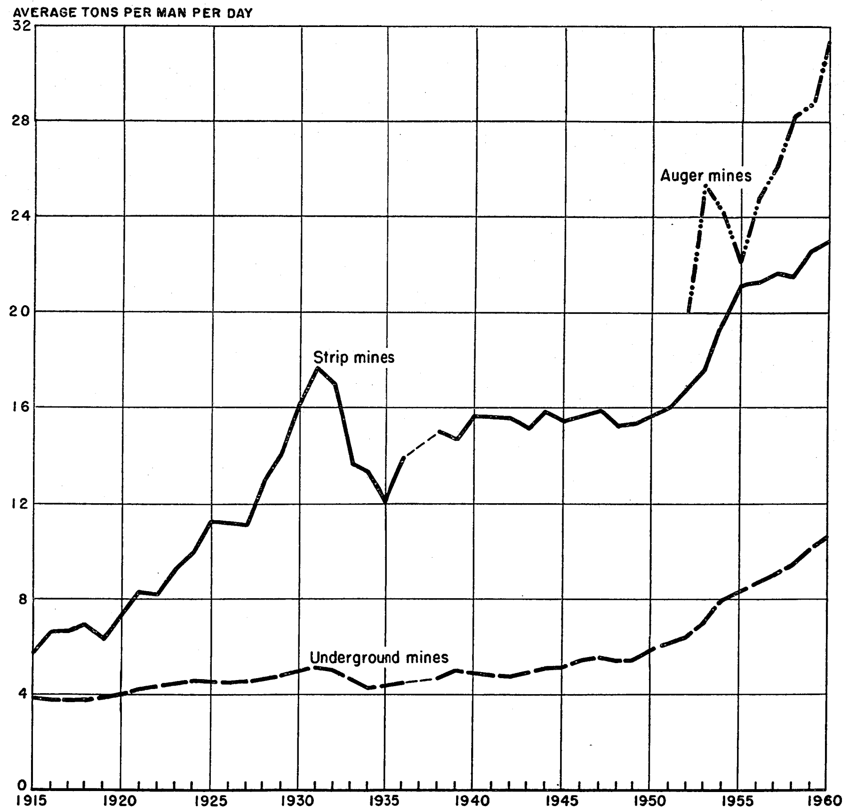

FIGURE 9.—Average tons per man per day at bituminous coal and lignite mines in the United States, 1915–60, by underground, strip, and auger mines.

TABLE 27.—Growth of strip mining at bituminous coal and lignite mines in the United States, compared with underground and auger mining

Year	Production (thousand net tons)				Percentage of total mined by stripping	Average tons per man per day				Average value per ton f.o.b. mine				Number of strip mines	Number of power shovels and draglines
	Underground mines	Strip mines [1]	Auger mines	Total		Underground mines	Strip mines [1]	Auger mines	Total	Underground mines	Strip mines [1]	Auger mines	Total		
1914	421,423	1,281	----------	422,704	0.3	3.71	5.06	----------	3.71	[2]	[2]	----------	$1.17	[3] 35	48
1915	439,792	2,832	----------	442,624	.6	3.90	5.81	----------	3.91	$1.13	$1.18	----------	1.13	[3] 60	87
1916	498,587	3,933	----------	502,520	.8	3.88	6.67	----------	3.90	1.32	1.51	----------	1.32	[3] 79	111
1917	546,001	5,790	----------	551,791	1.0	3.75	6.52	----------	3.77	2.26	2.34	----------	2.26	[3] 126	182
1918	571,098	8,288	----------	579,386	1.4	3.76	6.81	----------	3.78	2.58	2.54	----------	2.58	[3] 165	276
1919	460,225	5,635	----------	465,860	1.2	3.82	6.21	----------	3.84	2.49	2.33	----------	2.49	[3] 168	287
1920	559,807	8,860	----------	568,667	1.5	3.97	7.20	----------	4.00	3.74	4.12	----------	3.75	[3] 174	312
1921	410,865	5,057	----------	415,922	1.2	4.18	8.28	----------	4.20	2.89	2.87	----------	2.89	[3] 155	279
1922	412,059	10,209	----------	422,268	2.4	4.24	8.09	----------	4.28	3.02	3.07	----------	3.02	272	379
1923	552,625	11,940	----------	564,565	2.1	4.43	9.32	----------	4.47	2.69	2.31	----------	2.68	263	442
1924	470,080	13,607	----------	483,687	2.8	4.50	9.91	----------	4.56	2.20	2.00	----------	2.20	234	420
1925	503,182	16,871	----------	520,053	3.2	4.45	11.18	----------	4.52	2.05	1.84	----------	2.04	227	389
1926	556,444	16,923	----------	573,367	3.0	4.42	11.13	----------	4.50	2.07	1.89	----------	2.06	237	410
1927	499,385	18,378	----------	517,763	3.6	4.47	11.06	----------	4.55	1.99	1.90	----------	1.99	255	455
1928	480,956	19,789	----------	500,745	4.0	4.61	13.02	----------	4.73	1.87	1.69	----------	1.86	250	415
1929	514,721	20,268	----------	534,989	3.8	4.73	14.08	----------	4.85	1.79	1.57	----------	1.78	200	411
1930	447,684	19,842	----------	467,526	4.3	4.93	16.21	----------	5.06	1.71	1.54	----------	1.70	218	341
1931	363,157	18,932	----------	382,089	5.0	5.12	17.68	----------	5.30	1.54	1.51	----------	1.54	235	314
1932	290,069	19,641	----------	309,710	6.3	4.99	16.95	----------	5.22	1.31	1.32	----------	1.31	255	332
1933	315,360	18,270	----------	333,630	5.5	4.60	13.59	----------	4.78	1.34	1.33	----------	1.34	289	389
1934	338,578	20,790	----------	359,368	5.8	4.23	13.28	----------	4.40	1.76	1.49	----------	1.75	344	458
1935	348,726	23,647	----------	372,373	6.4	4.32	12.01	----------	4.50	1.79	1.47	----------	1.77	368	507
1936	410,962	28,126	----------	439,088	6.4	4.42	13.91	----------	4.62	1.77	1.49	----------	1.76	381	562
1937	413,780	31,751	----------	445,531	7.1	[2]	[2]	----------	4.69	[2]	[2]	----------	1.94	449	[2]
1938	318,138	30,407	----------	348,545	8.7	4.60	15.00	----------	4.89	[2]	[2]	----------	1.95	465	737
1939	357,133	37,722	----------	394,855	9.6	4.92	14.68	----------	5.25	1.88	1.49	----------	1.84	537	914
1940	417,604	43,167	----------	460,771	9.4	4.86	15.63	----------	5.19	1.94	1.56	----------	1.91	638	1,071
1941	459,078	55,071	----------	514,149	10.7	4.83	15.59	----------	5.20	2.23	1.79	----------	2.19	769	1,321
1942	515,490	67,203	----------	582,693	11.5	4.74	15.52	----------	5.12	2.41	1.90	----------	2.36	834	1,438
1943	510,492	79,685	----------	590,177	13.5	4.89	15.15	----------	5.38	2.75	2.28	----------	2.69	1,004	1,839
1944	518,678	100,898	----------	619,576	16.3	5.04	15.89	----------	5.67	3.01	2.48	----------	2.92	1,240	2,312

1945	467,630	109,987	----------	577,617	19.0	5.04	15.46	----------	5.78	3.16	2.65	----------	3.06	1,370	2,439
1946	420,958	112,964	----------	533,922	21.1	5.43	15.73	----------	6.30	3.59	2.87	----------	3.44	1,445	2,744
1947	491,229	139,395	----------	630,624	22.1	5.49	15.93	----------	6.42	4.35	3.47	----------	4.16	1,750	3,254
1948	460,012	139,506	----------	599,518	23.3	5.31	15.28	----------	6.26	5.26	4.11	----------	4.99	1,971	3,712
1949	331,823	106,045	----------	437,868	24.2	5.42	15.33	----------	6.43	5.18	3.94	----------	4.88	1,761	3,576
1950	392,844	123,467	----------	516,311	23.9	5.75	15.66	----------	6.77	5.15	3.87	----------	4.84	1,870	3,877
1951	415,842	117,618	205	533,665	22.0	6.08	16.02	----------	7.04	5.21	3.88	----------	4.92	1,784	3,810
1952	356,425	108,910	1,506	466,841	23.3	6.37	16.77	20.07	7.47	5.24	3.81	$4.31	4.90	1,643	3,527
1953	349,551	105,448	2,291	457,290	23.1	7.01	17.62	25.30	8.17	5.27	3.75	4.15	4.92	1,554	3,390
1954	289,112	98,134	4,460	391,706	25.1	7.99	19.64	24.12	9.47	4.87	3.52	3.41	4.52	1,329	3,409
1955	343,465	115,093	6,075	464,633	24.8	8.28	21.12	22.22	9.84	4.86	3.48	3.60	4.50	1,617	3,265
1956	365,774	127,055	8,045	500,874	25.4	8.62	21.18	24.85	10.28	5.20	3.74	4.17	4.82	1,728	3,705
1957	360,649	124,109	7,946	492,704	25.2	8.91	21.64	26.19	10.59	5.52	3.89	4.12	5.08	1,756	3,723
1958	286,884	116,242	7,320	410,446	28.3	9.38	21.54	28.15	11.33	5.33	3.80	3.60	4.86	1,646	3,515
1959	283,434	120,953	7,641	412,028	29.4	10.08	22.65	28.77	12.22	5.23	3.76	3.83	4.77	1,594	3,417
1960	284,888	122,630	7,994	415,512	29.5	10.64	22.93	31.36	12.83	5.14	3.74	3.37	4.69	1,530	3,313

[1] Includes power strip pits proper and excludes horse stripping operations and mines combining stripping and underground in the same operation for the period 1914–42. The years 1943–60 include data on all strip mines.

[2] Data not available.

[3] Exclusive of horse stripping operations.

TABLE 28.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States

Year	Number of strip mines	Production (thousand net tons)	Number of power shovels and dragline excavators												Number of carry-all scrapers	Number of bulldozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total		
			Electric	Diesel-electric	Diesel	Gasoline	Steam	Less than 3	3–5	6–12	More than 12	Power shovels	Dragline excavators			
1932	255	19,641	[1] 105	([2])	[3] 61	([4])	166	([5])	([5])	([5])	([5])	([5])	([5])	332	([5])	([5])
1933	289	18,270	[1] 117	([2])	[3] 103	([4])	169	([5])	([5])	([5])	([5])	([5])	([5])	389	([5])	([5])
1934	344	20,790	[1] 121	([2])	[3] 149	([4])	188	([5])	([5])	([5])	([5])	([5])	([5])	458	([5])	([5])
1935	368	23,647	[1] 139	([2])	[3] 194	([4])	174	([5])	([5])	([5])	([5])	([5])	([5])	507	([5])	([5])
1936	381	28,126	[1] 151	([2])	[3] 223	([4])	188	([5])	([5])	([5])	([5])	([5])	([5])	562	([5])	([5])
1937	449	31,751	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
1938	465	30,407	[1] 155	([2])	[3] 440	([4])	142	([5])	([5])	([5])	([5])	([5])	([5])	737	([5])	([5])
1939	537	37,722	[1] 184	([2])	[3] 524	([4])	206	([5])	([5])	([5])	([5])	([5])	([5])	914	([5])	([5])
1940	638	43,167	[1] 194	([2])	[3] 697	([4])	180	([5])	([5])	([5])	([5])	([5])	([5])	1,071	([5])	([5])
1941	769	55,071	[1] 210	([2])	[3] 911	([4])	200	1,009	153	95	64	([5])	([5])	1,321	([5])	([5])
1942	834	67,203	[1] 219	([2])	[3] 1,020	([4])	199	1,114	159	97	68	([5])	([5])	1,438	([5])	([5])
1943	1,004	79,685	[1] 234	([2])	[3] 1,433	([4])	172	1,488	173	106	72	([5])	([5])	1,839	([5])	([5])
1944	1,240	100,898	[1] 244	([2])	[3] 1,902	([4])	166	1,900	225	113	74	([5])	([5])	2,312	([5])	([5])
1945	1,370	109,987	[1] 256	([2])	[3] 2,042	([4])	141	2,004	243	117	75	([5])	([5])	2,439	([5])	([5])
1946	1,445	112,964	[1] 261	([2])	1,619	753	111	2,256	302	112	74	2,406	338	2,744	263	([5])
1947	1,750	139,395	[1] 301	([2])	2,279	591	83	2,685	362	123	84	2,822	432	3,254	275	([5])
1948	1,971	139,506	[1] 337	([2])	2,675	646	54	3,048	446	130	88	3,177	535	3,712	362	([5])
1949	1,761	106,045	[1] 352	([2])	2,646	527	51	2,931	367	168	110	3,011	565	3,576	320	([5])
1950	1,870	123,467	[1] 348	([2])	2,880	607	42	3,182	416	170	109	3,247	630	3,877	286	([5])
1951	1,784	117,618	[1] 346	([2])	2,905	533	26	3,088	420	187	115	3,164	646	3,810	220	([5])
1952	1,643	108,910	[1] 321	([2])	2,642	545	19	2,800	425	183	119	2,892	635	3,527	218	([5])
1953	1,554	105,448	[1] 317	([2])	2,629	446	17	2,692	413	193	111	2,793	616	3,409	244	1,954
1954	1,329	98,134	[1] 381	([2])	2,617	374	18	2,480	579	211	120	2,605	785	3,390	269	2,599
1955	1,617	115,093	[1] 315	([2])	2,603	337	10	2,381	550	223	111	2,592	673	3,265	187	2,106
1956	1,728	127,055	285	136	2,914	365	5	2,693	634	249	129	2,899	806	3,705	226	2,381
1957	1,756	124,109	325	164	2,839	389	6	2,748	566	266	143	2,894	829	3,723	215	2,499
1958	1,646	116,242	315	273	2,607	315	5	2,507	591	275	142	2,704	811	3,515	173	2,472
1959	1,594	120,953	309	215	2,579	307	7	2,435	572	267	143	2,607	810	3,417	161	2,443
1960	1,530	122,630	311	194	2,519	285	4	2,315	588	265	145	2,521	792	3,313	163	2,345

[1] Includes diesel-electric shovels.
[2] Included with electric shovels.
[3] Includes gasoline shovels.
[4] Included with diesel shovels.
[5] Data not available.

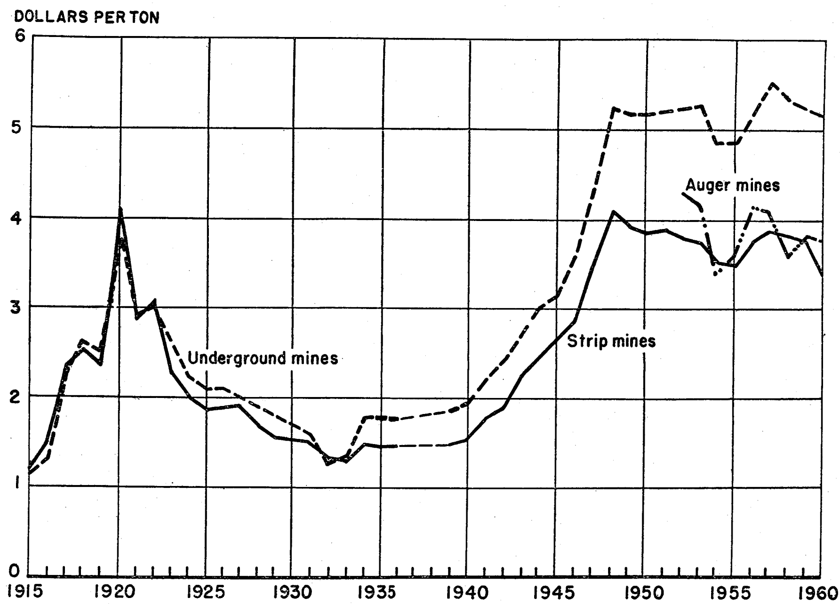

FIGURE 10.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, 1915–60, by underground, strip, and auger mines.

TABLE 29.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1960, by States

State	Number of strip mines	Production (net tons)	Number of power shovels and dragline excavators												Number of carryall scrapers	Number of bulldozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total		
			Electric	Diesel electric	Diesel	Gas	Steam	Less than 3	3-5	6-12	More than 12	Power shovels	Dragline excavators			
Alabama	39	2,558,414	11	8	69	3	2	58	18	11	6	77	16	93	7	57
Alaska	6	655,489	-	-	15	-	-	15	-	-	-	13	2	15	3	28
Arkansas	10	296,425	1	3	9	-	-	6	4	2	1	5	8	13	-	14
Colorado	7	692,849	2	2	5	-	-	5	2	2	-	5	4	9	5	13
Illinois	69	22,670,585	95	10	62	3	-	33	42	46	49	114	56	170	1	96
Indiana	47	10,784,967	45	19	52	8	-	48	38	18	20	72	52	124	2	71
Iowa	25	867,924	6	2	38	10	-	41	13	1	1	29	27	56	4	38
Kansas	11	884,690	6	4	11	1	1	15	3	2	3	13	10	23	1	14
Kentucky:																
Eastern	68	1,983,359	1	7	96	3	-	91	12	2	-	106	1	107	-	69
Western	61	17,688,833	35	2	96	9	-	62	36	28	16	103	39	142	6	99
Total Kentucky	129	19,672,192	36	9	192	12	-	153	48	30	16	209	40	249	6	168
Maryland	37	487,636	-	4	26	15	-	43	2	-	-	39	6	45	-	41
Missouri	23	2,801,937	13	4	21	13	-	30	9	4	8	33	18	51	-	33
Montana:																
Bituminous	2	8,031	-	-	1	-	-	1	-	-	-	1	-	1	1	1
Lignite	3	189,399	1	-	1	2	-	2	1	1	-	3	1	4	2	3
Total Montana	5	197,430	1	-	2	2	-	3	1	1	-	4	1	5	3	4
New Mexico	1	45,000	-	-	-	1	-	1	-	-	-	1	-	1	1	1
North Dakota (lignite)	31	2,522,552	19	2	22	12	-	34	10	10	1	44	11	55	25	34
Ohio	265	23,883,289	44	34	443	82	-	393	140	49	21	457	146	603	53	524
Oklahoma	15	1,093,965	5	9	9	-	1	11	4	5	4	14	10	24	1	12
Pennsylvania	553	20,875,533	11	61	1,121	105	-	1,012	196	77	13	936	362	1,298	20	809
South Dakota (lignite)	1	20,448	-	1	1	-	-	1	1	-	-	1	1	2	1	1
Tennessee	71	1,763,913	-	2	98	3	-	93	9	1	-	98	5	103	-	77
Virginia	35	1,370,864	11	-	52	3	-	61	5	-	-	66	-	66	4	40
Washington	1	16,177	-	-	-	-	-	-	-	-	-	-	-	-	-	2
West Virginia	140	6,754,001	1	19	264	9	-	244	43	4	2	280	13	293	9	247
Wyoming	9	1,713,384	4	1	7	3	-	13	-	2	-	11	4	15	17	21
Total	1,530	122,629,664	311	194	2,519	285	4	2,313	588	265	145	2,521	792	3,313	163	2,345

TABLE 30.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States

Year	Number of mines	Production		Number of power drills		
		Quantity (net tons)	Percentage of total	Horizontal	Vertical	Total
1946	514	75,375,841	66.7	(1)	(1)	764
1947	598	95,915,346	68.8	(1)	(1)	875
1948	728	98,809,393	72.3	(1)	(1)	1,195
1949	756	78,146,655	73.7	(1)	(1)	1,256
1950	692	87,205,280	70.6	(1)	(1)	1,201
1951	650	85,331,204	72.5	737	388	1,125
1952	629	79,252,284	73.0	685	385	1,070
1953	603	80,259,365	76.1	639	409	1,048
1954	541	70,107,205	71.4	592	391	983
1955	564	85,623,050	74.4	582	371	953
1956	696	96,278,779	75.8	652	389	1,041
1957	722	96,418,089	77.7	640	464	1,104
1958	737	91,659,662	78.9	615	464	1,079
1959	697	95,716,153	79.1	580	487	1,067
1960	714	96,660,466	78.8	551	498	1,049

[1] Data not available.

TABLE 31.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States by States

State	Number of mines		Production				Number of power drills					
			Quantity (net tons)		Percentage of total strip production		Horizontal		Vertical		Total	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	22	24	1,853,471	1,673,163	68.3	65.4	17	15	19	22	36	37
Alaska	5	6	482,670	655,489	89.0	100.0	4	4	8	11	12	15
Arkansas	7	7	257,262	293,983	99.6	99.2	5	5	5	3	10	8
Colorado	5	6	519,615	667,265	94.2	96.3	5	5	4	5	9	10
Illinois	44	41	19,731,384	18,278,805	90.0	80.6	35	29	37	37	72	66
Indiana	37	34	10,010,967	10,644,581	98.5	98.7	38	27	22	22	60	49
Iowa	25	20	910,811	846,346	95.8	97.5	24	22	14	11	38	33
Kansas	7	7	757,169	861,688	98.8	97.4	9	10	2	1	11	11
Kentucky:												
Eastern	34	25	990,066	1,183,033	58.2	59.6	32	23	8	6	40	29
Western	42	39	14,749,072	16,268,520	84.9	92.0	33	26	49	42	82	68
Total Kentucky	76	64	15,739,138	17,451,553	82.5	88.7	65	49	57	48	122	97
Maryland	7	4	211,791	96,589	38.6	19.8	1	1	2	2	3	3
Missouri	13	13	1,951,741	2,664,177	73.9	95.1	16	17	4	3	20	20
Montana:												
Bituminous	---------	2	-------------	8,031	---------	100.0	---------	1	---------	1	---------	2
Lignite	---------	---------	-------------	-------------	---------	---------	---------	---------	---------	---------	---------	---------
Total Montana	---------	2	-------------	8,031	---------	100.0	---------	1	---------	1	---------	2
New Mexico	1	1	30,000	45,000	94.6	100.0	1	---------	---------	1	1	1
North Dakota (lignite)	6	5	474,116	619,768	19.7	24.6	4	2	3	4	7	6
Ohio	105	118	19,070,844	18,564,902	77.4	77.7	83	77	89	102	172	179
Oklahoma	10	10	969,673	993,190	82.2	90.8	8	9	7	5	15	14
Pennsylvania	191	216	12,690,063	13,227,390	62.5	63.4	141	145	130	146	271	291
Tennessee	24	27	784,086	971,177	57.5	55.1	24	27	5	4	29	31
Virginia	15	13	1,093,882	949,835	62.1	69.3	12	13	7	6	19	19
Washington	1	1	20,030	16,177	85.4	100.0	---------	---------	1	1	1	1
West Virginia	89	88	5,527,019	5,455,240	76.3	80.8	82	86	64	58	146	144
Wyoming	7	7	1,630,421	1,676,117	99.0	97.8	6	7	7	5	13	12
Total	697	714	94,716,153	96,660,466	79.1	78.8	580	551	487	498	1,067	1,049

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TABLE 32.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States [1]

Year	Strip mines reporting method of haulage							Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Strip mines using rail, rail and truck, truck and tram—production (net tons)	Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)		Quantity (net tons)	Percentage of total strip production		
1948	97,450,399	7,214	9.4	3.7	6,327,989	103,778,388	74.4	35,727,532	139,505,920
1949	73,229,556	6,694	10.1	3.7	5,365,432	78,594,988	74.1	27,450,311	106,045,299
1950	88,666,733	6,564	10.3	3.8	4,364,333	93,031,066	75.3	30,435,498	123,466,564
1951	87,427,029	6,173	10.6	4.0	2,424,994	89,852,023	76.4	27,765,653	117,617,676
1952	88,589,637	5,799	11.3	4.0	2,296,744	90,886,381	83.5	18,023,375	108,909,756
1953	84,764,694	5,287	12.2	4.0	2,104,609	86,869,303	82.4	18,579,266	105,448,569
1954	73,794,489	4,250	13.2	3.9	1,203,753	74,998,242	76.4	23,136,008	98,134,250
1955	94,150,171	4,798	13.3	3.9	2,290,600	96,440,771	83.9	18,651,998	115,092,769
1956	103,127,374	5.432	13.3	4.4	1,056,627	104,184,001	82.0	22,871,381	127,055,382
1957	104,796,728	5,532	14.0	4.3	164,311	104,961,039	84.6	19,147,499	124,108,538
1958	99,223,676	5,151	14.5	4.4	19,241	99,242,917	85.4	16,998,870	116,241,787
1959	102,706,819	4,959	15.3	4.6		102,706,819	84.9	18,246,515	120,953,334
1960	104,099,974	4,855	15.5	4.8		104,099,974	84.9	18,529,690	122,629,664

[1] Excludes lignite in 1948 and 1949.

TABLE 33.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States, 1960, by States

State	Strip mines reporting method of haulage						Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)	Quantity (net tons)	Percentage of total strip production		
Alabama	1,836,113	115	17.3	3.8	1,836,113	71.8	722,301	2,558,414
Alaska	655,489	34	16.8	2.9	655,489	100.0		655,489
Arkansas	283,425	36	7.6	2.5	283,425	95.6	13,000	296,425
Colorado	667,265	21	18.7	2.5	667,265	96.3	25,584	692,849
Illinois	22,559,518	378	28.2	3.4	22,559,518	99.5	111,067	22,670,585
Indiana	10,578,683	162	28.9	5.0	10,578,683	98.1	206,284	10,784,967
Iowa	835,392	63	10.1	3.7	835,392	96.3	32,532	867,924
Kansas	877,736	25	19.8	2.3	877,736	99.2	6,954	884,690
Kentucky	17,838,750	507	15.3	4.4	17,838,750	90.7	1,833,442	19,672,192
Maryland	323,355	64	16.8	9.9	323,355	66.3	164,281	487,636
Missouri	2,693,295	76	22.1	5.2	2,693,295	96.1	108,642	2,801,937
Montana:								
Bituminous	8,031	2	.8	.3	8,031	100.0		8,031
Lignite	188,079	5	13.6	1.0	188,079	99.3	1,320	189,399
Total Montana	196,110	7	11.9	1.0	196,110	99.3	1,320	197,430
New Mexico	45,000	3	8.0	1.0	45,000	100.0		45,000
North Dakota (lignite)	2,469,776	87	13.5	2.6	2,469,776	97.9	52,776	2,522,552
Ohio	17,321,507	756	15.3	6.1	17,321,507	72.5	6,561,782	23,883,289
Oklahoma	1,032,557	124	9.9	7.6	1,032,557	94.4	61,408	1,093,965
Pennsylvania	16,331,728	1,657	12.3	5.7	16,331,728	78.2	4,543,805	20,875,533
South Dakota (lignite)	20,448	3	6.0	.5	20,448	100.0		20,448
Tennessee	639,025	118	12.8	6.9	639,025	36.2	1,124,888	1,763,913
Virginia	887,576	77	10.6	7.2	887,576	64.7	483,288	1,370,864
Washington	16,177	2	10.0	1.0	16,177	100.0		16,177
West Virginia	4,797,898	513	14.8	7.2	4,797,898	71.0	1,956,103	6,754,001
Wyoming	1,193,151	27	22.5	1.2	1,193,151	69.6	520,233	1,713,384
Total	104,099,974	4,855	15.5	4.8	104,099,974	84.9	18,529,690	122,629,664

TABLE 34.—Stripping operations in the bituminous coal and lignite fields of the United States, 1960, by States and counties

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama:						
Blount	4	157,245	48	204	9,834	15.99
Cullman	3	55,680	27	190	5,099	10.92
Jackson	1	5,872	8	100	800	7.34
Jefferson	7	277,512	101	227	22,897	12.12
Marion	3	102,967	39	238	9,226	11.16
Tuscaloosa	6	701,323	453	141	63,815	10.99
Walker	14	1,129,961	283	185	52,410	21.56
Winston	1	127,854	32	218	6,990	18.29
Total Alabama	39	2,558,414	991	173	171,071	14.96
Alaska	6	655,489	163	261	42,481	15.43
Arkansas:						
Franklin	1	117,127	20	234	4,689	24.98
Johnson	5	78,062	88	84	7,350	10.62
Pope	(1)	(1)	(1)	(1)	(1)	(1)
Sebastian	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	4	101,236	45	225	10,119	10.00
Total Arkansas	10	296,425	153	145	22,158	13.38
Colorado:						
El Paso	(1)	(1)	(1)	(1)	(1)	(1)
Fremont	2	29,609	22	38	831	35.62
Jackson	(1)	(1)	(1)	(1)	(1)	(1)
Montrose	(1)	(1)	(1)	(1)	(1)	(1)
Routt	2	409,559	77	222	16,987	24.11
Other counties	3	253,681	34	192	6,527	38.87
Total Colorado	7	692,849	133	183	24,345	28.46
Illinois:						
Adams	1	37,620	16	172	2,748	13.69
Bureau	(1)	(1)	(1)	(1)	(1)	(1)
Fulton	15	5,317,533	772	262	202,264	26.29
Gallatin	1	19,007	6	88	528	36.00
Greene	1	7,062	2	240	480	14.71
Jackson	(1)	(1)	(1)	(1)	(1)	(1)
Jefferson	1	23,602	13	210	2,729	8.65
Kankakee	(1)	(1)	(1)	(1)	(1)	(1)
Knox	(1)	(1)	(1)	(1)	(1)	(1)
Mercer	1	2,981	2	166	332	8.98
Peoria	7	413,349	96	215	20,554	20.11
Perry	2	2,826,912	269	291	78,156	36.17
Randolph	2	937,159	102	304	31,063	30.17
St. Clair	4	3,319,749	318	208	66,091	50.23
Saline	8	1,714,686	323	230	74,390	23.05
Schuyler	(1)	(1)	(1)	(1)	(1)	(1)
Stark	(1)	(1)	(1)	(1)	(1)	(1)
Vermilion	5	1,055,513	141	259	36,447	28.96
Wabash	1	1,133	1	113	113	10.00
Will	(1)	(1)	(1)	(1)	(1)	(1)
Williamson	9	2,280,130	283	247	69,986	32.58
Other counties	11	4,714,149	791	213	168,771	27.93
Total Illinois	69	22,670,585	3,135	241	754,652	30.04
Indiana:						
Clay	9	877,525	182	247	44,863	19.56
Daviess	1	38,771	17	180	3,060	12.67
Fountain	2	11,290	17	76	1,289	8.76
Greene	7	1,447,012	225	311	70,073	20.65
Knox	1	260,352	66	218	14,360	18.13
Owen	(1)	(1)	(1)	(1)	(1)	(1)
Parke	2	20,026	8	200	1,603	12.49
Pike	6	1,832,455	342	244	83,521	21.94
Spencer	(1)	(1)	(1)	(1)	(1)	(1)
Sullivan	2	182,818	45	208	9,342	19.57
Vermillion	1	4,458	3	46	128	34.83
Vigo	2	453,066	84	221	18,538	24.44
Warrick	9	5,267,833	379	269	102,070	51.61
Other counties	5	389,361	77	218	16,775	23.21
Total Indiana	47	10,784,967	1,445	253	365,622	29.50

See footnote at end of table.

TABLE 34.—Stripping operations in the bituminous coal and lignite fields of the United States, 1960, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Iowa:						
Keokuk	1	2,987	4	150	600	4.98
Lucas	1	8,000	3	250	750	10.67
Mahaska	7	253,778	57	284	16,175	15.69
Marion	10	514,322	108	218	23,496	21.89
Monroe	2	26,839	7	182	1,277	21.02
Van Buren	1	15,869	10	180	1,799	8.82
Wapello	3	46,129	13	287	3,729	12.37
Total Iowa	25	867,924	202	237	47,826	18.15
Kansas:						
Bourbon	1	4,206	3	200	600	7.01
Cherokee	4	584,757	114	277	31,557	18.53
Coffey	1	2,046	2	144	288	7.10
Crawford	4	291,361	78	239	18,617	15.65
Osage	1	2,320	5	117	636	3.65
Total Kansas	11	884,690	202	256	51,698	17.11
Kentucky, Eastern:						
Bell	17	402,776	79	127	9,985	40.34
Clay	6	252,761	39	261	10,119	24.98
Harlan	5	119,075	79	177	14,009	8.50
Jackson	3	35,153	35	100	3,515	10.00
Knott	1	18,021	18	100	1,802	10.00
Knox	2	38,157	15	68	1,036	36.83
Laurel	4	32,708	41	67	2,749	11.90
Lawrence	1	16,436	16	100	1,644	10.00
Lee	1	3,958	8	50	396	10.00
Leslie	(1)	(1)	(1)	(1)	(1)	(1)
Letcher	(1)	(1)	(1)	(1)	(1)	(1)
McCreary	1	120,624	15	131	1,960	61.54
Morgan	(1)	(1)	(1)	(1)	(1)	(1)
Owsley	(1)	(1)	(1)	(1)	(1)	(1)
Perry	1	44,512	30	100	2,967	15.00
Pike	5	91,566	44	260	11,431	8.01
Pulaski	(1)	(1)	(1)	(1)	(1)	(1)
Whitley	11	307,141	83	154	12,824	23.95
Other counties	10	500,471	263	110	28,805	17.37
Total Eastern Kentucky	68	1,983,359	765	135	103,242	19.21
Kentucky, Western:						
Butler	(1)	(1)	(1)	(1)	(1)	(1)
Caldwell	1	45,885	19	201	3,824	12.00
Christian	(1)	(1)	(1)	(1)	(1)	(1)
Daviess	3	921,152	68	304	20,709	44.48
Hancock	(1)	(1)	(1)	(1)	(1)	(1)
Hopkins	20	4,498,986	435	246	106,915	42.08
McLean	1	58,000	19	200	3,867	15.00
Muhlenberg	9	7,751,149	655	270	176,886	43.82
Ohio	15	2,990,697	231	276	63,876	46.82
Union	2	82,481	12	175	2,044	40.35
Webster	5	996,039	228	206	46,939	21.22
Other counties	5	344,444	112	141	15,799	21.80
Total Western Kentucky	61	17,688,833	1,779	248	440,859	40.12
Total Kentucky	129	19,672,192	2,544	214	544,101	36.16
Maryland:						
Allegany	16	112,348	51	198	10,076	11.15
Garrett	21	375,288	105	204	21,372	17.56
Total Maryland	37	487,636	156	202	31,448	15.51
Missouri:						
Barton	(1)	(1)	(1)	(1)	(1)	(1)
Bates	1	1,042	3	86	259	4.02
Callaway	(1)	(1)	(1)	(1)	(1)	(1)
Clark	1	11,658	8	191	1,528	7.63
Dade	1	16,000	10	278	2,783	5.75
Henry	6	1,456,083	159	263	41,866	34.78
Linn	1	1,275	2	180	360	3.54
Putnam	(1)	(1)	(1)	(1)	(1)	(1)

See footnote at end of table.

TABLE 34.—Stripping operations in the bituminous coal and lignite fields of the United States, 1960, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Missouri—Continued						
Ralls	2	3,365	7	159	1,111	3.03
Randolph	(1)	(1)	(1)	(1)	(1)	(1)
St. Clair	(1)	(1)	(1)	(1)	(1)	(1)
Vernon	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	11	1,312,514	1,480	128	188,918	6.95
Total Missouri	23	2,801,937	1,669	142	236,825	11.83
Montana (bituminous):						
Carbon	(1)	(1)	(1)	(1)	(1)	(1)
Rosebud	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	2	8,031	9	187	1,680	4.78
Total Montana (bituminous)	2	8,031	9	187	1,680	4.78
Montana (lignite):						
Dawson	(1)	(1)	(1)	(1)	(1)	(1)
Richland	(1)	(1)	(1)	(1)	(1)	(1)
Sheridan	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	3	189,399	18	200	3,607	52.51
Total Montana (lignite)	3	189,399	18	200	3,607	52.51
Total Montana	5	197,430	27	196	5,287	37.34
New Mexico: McKinley	1	45,000	4	250	1,000	45.00
North Dakota (lignite):						
Adams	1	11,787	8	174	1,393	8.46
Bowman	1	147,279	15	189	2,842	51.82
Burke	2	406,600	52	240	12,488	32.56
Burleigh	1	14,132	3	206	618	22.87
Divide	1	227,720	53	184	9,740	23.38
Dunn	1	5,793	3	260	780	7.43
Grant	4	21,181	5	154	770	27.51
Hettinger	1	5,000	13	48	627	7.97
McLean	3	76,099	24	151	3,627	20.98
Mercer	4	1,019,039	95	219	20,792	49.01
Morton	4	21,844	12	146	1,756	12.44
Oliver	2	8,748	5	170	849	10.30
Stark	3	75,224	7	169	1,186	63.43
Ward	3	482,106	45	235	10,577	45.58
Total North Dakota (lignite)	31	2,522,552	340	200	68,045	37.07
Ohio:						
Athens	(1)	(1)	(1)	(1)	(1)	(1)
Belmont	22	1,728,496	368	167	61,403	28.15
Carroll	9	342,055	73	273	20,003	17.10
Columbiana	36	1,360,458	287	262	75,205	18.09
Coshocton	12	1,674,294	231	292	67,566	24.78
Gallia	8	720,219	175	203	35,619	20.22
Guernsey	7	211,956	74	221	16,342	12.97
Harrison	9	4,702,204	632	226	142,837	32.92
Hocking	5	36,437	21	117	2,449	14.88
Holmes	5	80,448	29	162	4,691	17.15
Jackson	11	256,455	71	262	18,517	13.85
Jefferson	28	2,390,445	432	244	105,492	22.66
Lawrence	4	449,410	83	229	19,027	23.62
Mahoning	16	906,798	226	237	53,498	16.95
Meigs	(1)	(1)	(1)	(1)	(1)	(1)
Morgan	2	2,243,394	251	251	62,928	35.65
Muskingum	6	385,041	72	247	17,900	21.51
Noble	9	1,722,088	169	264	44,487	38.71
Perry	12	1,481,153	293	197	57,767	25.64
Portage	1	84,331	22	275	6,058	13.92
Stark	17	691,774	155	249	38,560	17.94
Tuscarawas	31	1,842,010	464	248	114,982	16.02
Vinton	6	183,452	80	236	18,835	9.74
Washington	(1)	(1)	(1)	(1)	(1)	(1)
Wayne	2	53,062	36	264	9,509	5.58
Other counties	7	337,309	132	142	18,764	17.98
Total Ohio	265	23,883,289	4,376	231	1,012,439	23.59

See footnote at end of table.

TABLE 34.—Stripping operations in the bituminous coal and lignite fields of the United States, 1960, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Oklahoma:						
Craig	3	76,874	17	225	3,832	20.06
Haskell	5	327,719	113	170	19,131	17.13
Le Flore	(1)	(1)	(1)	(1)	(1)	(1)
McIntosh	(1)	(1)	(1)	(1)	(1)	(1)
Nowata	2	41,995	17	286	4,861	8.64
Rogers	(1)	(1)	(1)	(1)	(1)	(1)
Sequoyah	1	187,816	31	254	7,881	23.83
Other counties	4	459,561	137	228	31,225	14.72
Total Oklahoma	15	1,093,965	315	212	66,930	16.34
Pennsylvania:						
Allegheny	22	566,532	135	211	28,469	19.90
Armstrong	39	1,413,167	308	224	68,969	20.49
Beaver	26	360,863	88	191	16,745	21.55
Bedford	(1)	(1)	(1)	(1)	(1)	(1)
Blair	(1)	(1)	(1)	(1)	(1)	(1)
Bradford	(1)	(1)	(1)	(1)	(1)	(1)
Butler	37	1,790,127	350	234	81,816	21.88
Cambria	23	497,690	218	164	35,831	13.89
Cameron	(1)	(1)	(1)	(1)	(1)	(1)
Centre	17	686,195	214	271	58,005	11.83
Clarion	35	2,673,658	615	266	163,526	16.35
Clearfield	106	5,030,090	1,401	234	327,907	15.34
Clinton	5	469,490	108	268	29,035	16.17
Elk	10	129,007	59	158	9,268	13.92
Fayette	30	342,184	143	124	17,767	19.26
Greene	1	2,260	2	80	145	15.55
Huntingdon	4	45,661	21	190	3,991	11.44
Indiana	28	744,035	261	186	48,471	15.35
Jefferson	30	919,705	292	205	59,760	15.39
Lawrence	21	903,094	182	234	42,659	21.17
Lycoming	3	48,604	22	184	3,977	12.22
McKean	(1)	(1)	(1)	(1)	(1)	(1)
Mercer	6	689,778	165	231	38,004	18.15
Somerset	43	1,166,224	337	201	67,725	17.22
Tioga	6	278,341	72	207	14,900	18.68
Venango	11	588,189	114	184	21,029	27.97
Washington	22	991,455	259	206	53,361	18.58
Westmoreland	20	252,308	100	114	11,422	22.09
Other counties	8	286,876	94	242	22,743	12.61
Total Pennsylvania	553	20,875,533	5,560	220	1,225,525	17.03
South Dakota (lignite): Dewey	1	20,448	9	225	2,025	10.10
Tennessee:						
Anderson	11	367,978	73	196	14,369	25.61
Campbell	16	419,148	156	127	19,855	21.11
Claiborne	6	115,303	42	145	6,021	19.15
Cumberland	4	67,582	17	125	2,080	32.49
Fentress	3	9,670	6	150	967	10.00
Grundy	5	156,709	38	197	7,494	20.91
Marion	(1)	(1)	(1)	(1)	(1)	(1)
Morgan	10	193,549	45	158	7,061	27.41
Overton	3	47,963	27	150	3,997	12.00
Scott	7	182,636	59	213	12,475	14.64
Sequatchie	2	115,949	20	281	5,684	20.40
Van Buren	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	4	87,426	23	179	4,108	21.28
Total Tennessee	71	1,763,913	506	166	84,111	20.97
Virginia:						
Buchanan	(1)	(1)	(1)	(1)	(1)	(1)
Dickenson	1	172,207	34	200	6,888	25.00
Lee	2	91,357	13	219	2,775	32.92
Russell	(1)	(1)	(1)	(1)	(1)	(1)
Tazewell	2	23,517	16	100	1,568	15.00
Wise	26	990,877	189	194	36,618	27.06
Other counties	4	92,906	17	197	3,352	27.72
Total Virginia	35	1,370,864	269	190	51,201	26.77

See footnote at end of table.

TABLE 34.—Stripping operations in the bituminous coal and lignite fields of the United States, 1960, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Washington: Kittitas	1	16,177	6	257	1,656	9.77
West Virginia:						
Barbour	19	755,000	175	146	25,602	29.49
Boone	(1)	(1)	(1)	(1)	(1)	(1)
Braxton	1	23,846	6	56	336	70.97
Brooke	6	218,927	59	206	12,176	17.98
Clay	1	3,699	15	68	1,019	3.63
Fayette	3	71,446	32	141	4,468	15.99
Gilmer	(1)	(1)	(1)	(1)	(1)	(1)
Grant	(1)	(1)	(1)	(1)	(1)	(1)
Greenbrier	7	347,106	100	163	16,281	21.32
Harrison	23	1,036,296	261	233	60,744	17.06
Kanawha	3	95,820	33	191	6,296	15.22
Lewis	3	384,905	121	219	26,418	14.57
Logan	(1)	(1)	(1)	(1)	(1)	(1)
Marion	2	10,642	4	95	379	28.08
Mason	(1)	(1)	(1)	(1)	(1)	(1)
McDowell	9	474,116	1,042	175	182,422	25.99
Mercer	2	64,302	6	140	878	73.25
Mineral	1	52,813	11	251	2,761	19.13
Mingo	(1)	(1)	(1)	(1)	(1)	(1)
Monongalia	5	73,597	27	197	5,314	13.85
Nicholas	5	242,246	75	132	9,953	24.34
Pocahontas	1	44,420	23	264	6,152	7.22
Preston	16	869,997	170	254	43,197	20.14
Raleigh	5	84,155	40	98	3,960	21.25
Randolph	6	179,003	44	211	9,299	19.25
Tucker	4	251,800	119	142	16,865	14.93
Upshur	5	52,052	39	93	3,592	14.49
Wyoming	6	558,805	151	133	20,123	27.77
Other counties	7	859,008	175	209	36,585	23.48
Total West Virginia	146	6,754,001	2,728	181	494,820	13.65
Wyoming:						
Campbell	1	458,644	28	300	8,402	54.59
Carbon	(1)	(1)	(1)	(1)	(1)	(1)
Converse	2	525,998	17	278	4,733	111.13
Lincoln	(1)	(1)	(1)	(1)	(1)	(1)
Sheridan	2	382,377	46	232	10,657	35.88
Other counties	4	346,365	137	145	19,922	17,39
Total Wyoming	9	1,713,384	228	192	43,714	39.20
Total United States	1,530	122,629,664	25,161	213	5,348,980	22.93

[1] Included in "Other counties" to avoid disclosing individual operations.

AUGER MINING

Augers are generally used in areas where strip mining has become economically impracticable because of thick overburden. They were used first about 1945, and separate statistics on coal-recovery augers begin with 1951. The rapidly expanded production of coal by stripping during World War II in the mountainous areas of the northern Appalachian region left many miles of high wall containing exposed coal seams. After several years of experimentation, large, efficient augers as much as 60 inches in diameter were developed to recover the coal from these exposed coal seams.

Production at auger mines increased rapidly from 205,000 tons in 1951 to 8 million tons in 1960. Augers were used to mine coal in seven States in 1960, and sales of augers reported by four manufacturers indicate continued growth of auger mining. A few coal-recovery augers have been sold for underground use; these units and the coal produced by them have been included with coal loaded mechanically underground.

TABLE 35.—Auger mines in the bituminous coal and lignite fields of the United States, 1960, by States and counties

State and county	Number of auger mines	Equipment in use (number of units)				Mined by augers (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Augers	Power shovels	Power drills	Bulldozers					
Alabama: Walker	3	3	------	------	------	86,893	15	220	3,301	26.32
Kentucky, Eastern:										
Bell	14	13	1	------	11	483,035	124	93	11,545	41.84
Clay	7	7	2		3	97,439	29	147	4,249	22.93
Floyd	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Harlan	15	16	1	1	13	379,241	105	131	13,736	27.61
Knott	5	5	------	------	4	147,186	210	62	13,048	11.28
Knox	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Leslie	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Letcher	11	11	------	1	1	190,994	49	101	4,967	38.45
Perry	14	14	5	------	11	652,673	113	158	17,837	36.59
Pike	31	32	3	1	10	638,101	176	122	21,470	29.72
Whitley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	6	6	1	1	3	88,614	38	71	2,686	32.99
Total Eastern Kentucky	103	104	13	4	56	2,677,283	844	106	89,538	29.90
Kentucky, western:										
Ohio	1	1	------	------	1	24,603	8	45	360	68.34
Webster	1	1	------	------	------	3,940	2	100	197	20.00
Total Western Kentucky	2	2	------	------	1	28,543	10	56	557	51.24
Total Kentucky	105	106	13	4	57	2,705,826	854	105	90,095	30.03
Ohio:										
Belmont	8	8	------	1	4	79,522	19	164	3,157	25.19
Carroll	3	3	------	------	------	19,142	5	66	332	57.66
Columbiana	8	8	------	------	1	43,652	15	118	1,776	24.58
Coshocton	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Gallia	5	5	------	------	4	65,516	17	127	2,221	29.50
Harrison	4	4	1	------	7	113,471	18	91	1,676	67.71
Hocking	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Jefferson	6	6	1	------	2	219,151	19	179	3,400	64.46
Meigs	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Muskingum	3	3	------	------	------	42,713	10	94	938	45.54
Noble	3	3	------	------	1	53,073	5	142	770	68.94
Perry	2	2	------	------	2	71,156	7	117	827	86.02
Stark	1	1	------	------	1	2,744	1	41	41	66.93
Tuscarawas	4	4	------	------	------	35,500	9	126	1,167	30.42
Vinton	1	1	1	------	------	3,082	8	41	328	9.40
Washington	3	3	------	------	3	90,805	18	160	2,883	31.50
Other counties	5	5	1	------	4	27,556	14	65	912	30.21
Total Ohio	56	56	4	1	29	867,083	165	124	20,428	42.45
Pennsylvania:										
Armstrong	10	10	------	------	2	110,759	69	108	7,399	14.97
Butler	5	6	------	------	------	51,190	14	134	1,828	28.01
Cambria	4	4	------	------	3	7,273	3	93	281	25.92
Centre	2	2	------	------	1	18,969	2	250	499	38.02
Clarion	1	1	------	------	2	9,849	7	100	657	15.00
Clearfield	9	12	------	------	3	103,338	50	165	8,267	12.50
Elk	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Fayette	1	1	------	------	1	1,071	1	100	71	15.00
Indiana	4	4	------	------	4	49,635	13	116	1,511	32.85
Jefferson	5	5	------	------	3	35,258	11	206	2,239	15.75
Lawrence	1	1	------	------	1	20,982	7	150	1,049	20.00
Somerset	1	1	------	------	------	1,331	3	36	108	12.32
Washington	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Westmoreland	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	6	6	------	------	5	69,517	21	93	1,944	35.76
Total Pennsylvania	49	53	------	------	25	479,172	201	129	25,853	18.53

See footnote at end of table

TABLE 35.—Auger mines in the bituminous coal and lignite fields of the United States, 1960, by States and counties—Continued

State and county	Number of auger mines	Equipment in use (number of units): Augers	Power shovels	Power drills	Bulldozers	Mined by augers (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Tennessee:										
Anderson	4	4	-------	1	-------	90,143	23	104	2,404	37.50
Campbell	2	2	-------	-------	-------	18,118	5	123	636	28.50
Claiborne	1	1	-------	-------	-------	34,306	34	100	3,431	10.00
Marion	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Morgan	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Scott	3	3	-------	1	1	32,812	11	117	1,328	24.70
Other counties	2	2	-------	-------	1	52,532	17	58	990	53.06
Total Tennessee	12	12	-------	2	2	227,911	90	98	8,789	25.93
Virginia:										
Buchanan	8	8	1	2	5	106,240	28	110	3,133	33.91
Dickenson	1	1	-------	-------	1	6,501	2	150	325	20.00
Lee	4	4	-------	-------	4	147,101	20	219	4,468	32.92
Russell	4	5	-------	-------	4	71,559	9	210	1,818	39.37
Tazewell	4	4	1	-------	5	111,686	17	189	3,291	33.94
Wise	11	9	-------	2	8	204,114	34	194	6,555	31.14
Total Virginia	32	31	2	4	27	647,201	110	178	19,590	33.04
West Virginia:										
Barbour	4	3	-------	-------	1	107,440	10	181	1,756	61.18
Boone	5	9	7	-------	8	347,477	67	152	10,151	34.23
Braxton	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Brooke	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Clay	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Fayette	6	8	-------	-------	4	68,920	38	108	4,068	16.94
Gilmer	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Greenbrier	1	1	-------	-------	-------	4,408	4	120	480	9.18
Harrison	9	7	-------	-------	2	176,086	44	138	6,024	29.23
Kanawha	6	8	4	-------	11	820,307	86	201	17,317	47.37
Lewis	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Logan	5	5	-------	-------	7	247,907	54	78	4,228	58.64
Mason	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
McDowell	7	8	-------	-------	1	130,223	33	110	3,625	35.92
Mercer	1	1	-------	-------	-------	2,746	1	140	140	19.61
Mineral	1	1	-------	-------	-------	14,706	11	251	2,759	5.33
Mingo	5	5	1	-------	3	103,618	93	66	6,120	16.93
Monongalia	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Nicholas	7	8	3	-------	5	171,060	48	117	5,599	30.55
Pocahontas	1	1	-------	-------	1	4,958	3	130	390	12.71
Preston	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Raleigh	6	7	2	-------	8	195,784	58	135	7,850	24.94
Randolph	3	3	-------	-------	1	28,693	10	136	1,359	21.11
Taylor	2	2	-------	-------	1	43,474	12	83	959	45.32
Upshur	1	1	-------	-------	1	5,366	5	100	537	10.00
Webster	1	1	1	-------	2	15,365	3	187	561	27.39
Wyoming	4	4	-------	-------	-------	32,057	17	100	1,652	19.41
Other counties	14	18	5	-------	22	459,692	114	99	11,315	40.63
Total West Virginia	89	101	23	-------	78	2,980,287	711	122	86,890	34.30
Total United States	346	362	42	11	218	7,994,373	2,146	119	254,946	31.36

[1] Included in "Other counties" to avoid disclosing individual operations.

TABLE 36.—Units of coal-recovery augers sold to bituminous coal and lignite mines for surface use in the United States, as reported by manufacturers, by States

State	1956	1957	1958	1959	1960
Alabama			1	1	
Illinois	2			1	
Kentucky	15	16	13	21	8
Missouri		1			
Ohio	12	7	4	7	5
Pennsylvania	10	7	6	7	7
Tennessee	2	1	5	2	1
Virginia	7	5	4	1	1
West Virginia	41	16	9	7	3
Total	89	53	42	47	25

MECHANICAL LOADING

In the past 10 years the proportion of bituminous coal and lignite loaded mechanically at underground mines has increased from 69 to 86 percent of the total output. Although overall mechanization gained gradually during this period, the proportion produced by mobile loading into mine cars decreased from 38 to 3 percent of the total mechanically loaded, and mobile loading into shuttle cars increased from 38 to 58 percent; production from continuous mining machines increased from 2 to 32 percent, and all other types of mechanical loading decreased from 22 to 7 percent.

The most important change in mechanical loading in recent years was the introduction of continuous mining machines. In 1960, 78 million tons of bituminous coal was produced at 241 mines by continuous mining machines, compared with 66 million tons in 1959 from 224 mines. In 1960, 80 mines used continuous mining machines exclusively, compared with 59 in 1959.

Sales of mobile loading machines increased; sales of all other major types of loading and mining equipment decreased.

TABLE 37.—Growth of mechanical loading at underground bituminous coal and lignite mines in the United States

Year	Underground production (thousand net tons): Mechanically loaded: Mobile loading machines	Mechanically loaded: Scrapers and duck-bills[1]	Mechanically loaded: Pit-car loaders and hand-loaded con-veyors[1]	Mechanically loaded: Con-tinuous mining machines	Mechanically loaded: Total mechan-ically loaded	Hand-loaded into mine cars	Total under-ground produc-tion	Percentage of underground production—: Mechan-ically loaded	Percentage of underground production—: Hand-loaded into mine cars	Number of mechanical loading units: Mobile loading machines	Number of mechanical loading units: Scrapers and duck-bills[1]	Number of mechanical loading units: Pit-car loaders and hand-loaded con-veyors[1]	Number of mechanical loading units: Con-tinuous mining machines
1923	(2)	(2)	(2)	----------	[3] 1,880	550,745	552,625	0.3	99.7	(2)	(2)	(2)	----------
1924	(2)	(2)	(2)	----------	[3] 3,496	466,584	470,080	.7	99.3	(2)	(2)	(2)	----------
1925	(2)	(2)	(2)	----------	[3] 6,243	496,939	503,182	1.2	98.8	(2)	(2)	(2)	----------
1926	7,786	2,236	523	----------	[3] 10,545	545,899	556,444	1.9	98.1	295	160	(2)	----------
1927	(2)	(2)	(2)	----------	16,500	482,885	499,385	3.3	96.7	(2)	(2)	(2)	----------
1928	11,811	2,748	7,000	----------	21,559	459,397	480,956	4.5	95.5	397	212	1,040	----------
1929	16,432	2,859	18,571	----------	37,862	476,859	514,721	7.4	92.6	488	225	2,521	----------
1930	20,073	3,265	23,644	----------	46,982	400,702	447,684	10.5	89.5	545	290	2,876	----------
1931	19,407	3,282	24,873	----------	47,562	315,595	363,157	13.1	86.9	583	311	3,428	----------
1932	14,825	2,762	18,230	----------	35,817	254,252	290,069	12.3	87.7	548	287	3,112	----------
1933	17,865	2,647	17,309	----------	37,821	277,539	315,360	12.0	88.0	523	225	2,978	----------
1934	20,750	3,086	17,597	----------	41,433	297,145	338,578	12.2	87.8	534	276	2,862	----------
1935	24,675	3,713	18,789	----------	47,177	301,549	348,726	13.5	86.5	657	257	2,768	----------
1936	40,970	4,513	21,494	----------	66,977	343,985	410,962	16.3	83.7	980	340	2,787	----------
1937	(2)	(2)	(2)	----------	83,500	330,280	413,780	20.2	79.8	(2)	(2)	(2)	----------
1938	57,824	5,279	21,990	----------	85,093	233,045	318,138	26.7	73.3	1,405	463	2,918	----------
1939	76,442	7,766	26,504	----------	110,712	246,421	357,133	31.0	69.0	1,573	690	2,707	----------
1940	100,962	11,617	35,291	----------	147,870	269,734	417,604	35.4	64.6	1,720	772	2,960	----------
1941	126,478	16,208	43,981	----------	186,667	272,411	459,078	40.7	59.3	1,985	897	3,414	----------
1942	160,301	22,088	50,514	----------	232,903	282,587	515,490	45.2	54.8	2,301	1,155	3,522	----------
1943	179,008	24,266	46,531	----------	249,805	260,687	510,492	48.9	51.1	2,525	1,309	3,512	----------
1944	202,875	24,505	46,809	----------	274,189	244,489	518,678	52.9	47.1	2,737	1,418	3,477	----------
1945	198,668	22,758	41,086	----------	262,512	205,118	467,630	56.1	43.9	2,950	1,470	3,527	----------
1946	186,975	20,595	37,771	----------	245,341	175,617	420,958	58.3	41.7	3,200	1,596	3,563	----------
1947	229,836	22,775	45,546	----------	298,157	193,072	491,229	60.7	39.3	3,569	1,598	4,050	----------
1948	232,217	20,377	42,762	450	295,806	164,206	460,012	64.3	35.7	3,965	1,688	4,162	15
1949	174,639	14,333	30,804	2,600	222,376	109,447	331,823	67.0	33.0	4,155	1,529	4,329	50

See footnote at end of table.

TABLE 37.—Growth of mechanical loading at underground bituminous coal and lignite mines in the United States—Continued

Year	Underground production (thousand net tons)							Percentage of underground production—		Number of mechanical loading units			
	Mechanically loaded					Hand-loaded into mine cars	Total underground production	Mechanically loaded	Hand-loaded into mine cars	Mobile loading machines	Scrapers and duck-bills [1]	Pit-car loaders and hand-loaded conveyors [1]	Continuous mining machines
	Mobile loading machines	Scrapers and duck-bills [1]	Pit-car loaders and hand-loaded conveyors [1]	Continuous mining machines	Total mechanically loaded								
1950	218,126	14,303	35,446	4,850	272,725	120,119	392,844	69.4	30.6	4,228	1,368	4,446	90
1951	246,397	14,010	37,583	6,061	304,051	111,791	415,842	73.1	26.9	4,302	1,264	3,904	108
1952	218,982	10,667	31,130	8,215	268,994	87,431	356,425	75.5	24.5	4,083	1,068	3,569	152
1953	232,585	8,770	25,144	11,830	278,329	71,222	349,551	79.6	20.4	3,985	878	2,994	219
1954	206,546	5,083	15,005	16,336	242,970	46,142	289,112	84.0	16.0	4,314	681	2,162	325
1955	243,204	4,510	15,497	27,460	290,671	52,794	343,465	84.6	15.4	3,819	510	1,925	385
1956	248,341	3,883	15,271	39,907	307,402	58,372	365,774	84.0	16.0	3,854	472	1,819	510
1957	236,720	2,781	12,453	53,783	305,737	54,912	360,649	84.8	15.2	3,755	375	1,528	614
1958	178,014	1,560	7,626	56,373	243,573	43,311	286,884	84.9	15.1	3,434	249	1,230	679
1959	171,150	1,010	5,779	65,792	243,731	39,703	283,434	86.0	14.0	3,121	144	1,014	776
1960	162,109	1,232	4,517	77,928	245,786	39,102	284,888	86.3	13.7	2,952	159	931	879

[1] For additional detail data by type of loading, see Minerals Yearbook 1959, vol. II, p. 86. Canvass of pit-car loaders discontinued in 1951.

[2] Data not available.

[3] Exclusive of tonnage "Handled by conveyors."

TABLE 38.—Bituminous coal and lignite mechanically loaded underground in the United States, by type of loading equipment

Type of equipment	1959		1960	
	Net tons	Percentage of total	Net tons	Percentage of total
Mobile loading machines:				
Loading direct into mine cars	11,282,975	4.6	8,137,606	3.3
Loading onto conveyors	11,626,461	4.8	11,195,270	4.6
Loading into shuttle cars	148,240,818	60.8	142,775,484	58.1
Continuous mining machines:				
Loading onto conveyors	8,614,832	3.5	10,474,509	4.3
Loading into shuttle cars	57,177,244	23.5	67,453,771	27.4
Scrapers and conveyors equipped with duckbills or other self-loading heads	1,009,601	.4	1,232,019	.5
Hand-loaded conveyors	5,779,253	2.4	4,517,116	1.8
Total mechanically loaded	243,731,184	100.0	245,785,775	100.0

TABLE 39.—Comparative changes in underground mechanical loading of bituminous coal and lignite by principal types of loading devices in the United States by States

State	Net tons by—						Total mechanically loaded (net tons)		Total production at mines using mechanical loading devices (net tons)		Handled by each class (percent)					
	Loading machines [1]		Continuous mining machines		Hand-loaded conveyors						Loading machines [1]		Continuous mining machines		Hand-loaded conveyors	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	6,943,507	8,513,777	1,287,414	829,502	388,178	336,570	8,619,099	9,679,849	8,623,060	9,681,871	80.6	87.9	14.9	8.6	4.5	3.5
Alaska		2,095						2,095		66,982		100.0				
Arkansas	20,742	9,500	28,618	13,108	125,235	90,166	174,595	112,774	174,595	112,774	11.9	8.4	16.4	11.6	71.7	80.0
Colorado	1,351,942	1,293,383	853,975	1,040,233	209,432	280,048	2,415,349	2,613,664	2,653,858	2,835,029	56.0	49.5	35.3	39.8	8.7	10.7
Illinois	17,368,976	16,246,149	5,980,466	6,952,413			23,349,442	23,198,562	23,359,858	23,199,394	74.4	70.0	25.6	30.0		
Indiana	4,109,682	3,948,743	427,012	716,207			4,536,694	4,664,950	4,536,694	4,665,909	90.6	84.6	9.4	15.4		
Iowa	97,372	93,281					97,372	93,281	97,372	93,281	100.0	100.0				
Kentucky	27,847,801	28,372,532	2,990,829	3,861,592	260,744	284,189	31,099,374	32,518,313	31,298,807	32,634,837	89.6	87.2	9.6	11.9	.8	.9
Maryland					126,173	97,238	126,173	97,238	134,667	106,634					100.0	100.0
Montana (bituminous)	125,029	91,138			5,068	5,570	130,097	96,708	130,097	96,708	96.1	94.2			3.9	5.8
New Mexico	22,799		44,354	203,489	400		67,553	203,489	76,570	203,489	33.7		65.7	100.0	.6	
Ohio	5,680,952	5,406,495	2,813,759	2,984,789	95,703	99,541	8,590,414	8,490,825	8,600,859	8,490,825	66.1	63.7	32.8	35.1	1.1	1.2
Oklahoma	31,642	12,000			308,330	231,802	339,972	243,802	339,972	243,802	9.3	4.9			90.7	95.1
Pennsylvania	17,684,236	13,419,718	22,661,111	27,012,367	1,397,631	954,491	41,742,978	41,386,576	41,875,012	41,539,218	42.4	32.4	54.3	65.3	3.3	2.3
Tennessee	1,708,776	1,834,870	36,000	116,597	120,801	184,764	1,865,577	2,136,231	1,877,330	2,152,648	91.6	85.9	1.9	5.5	6.5	8.6
Utah	3,364,653	3,464,718	1,169,479	1,479,708			4,534,132	4,944,426	4,534,132	4,944,426	74.2	70.1	25.8	29.9		
Virginia	13,249,416	13,699,143	1,283,137	1,025,447	169,123	137,373	14,701,676	14,861,963	14,999,810	15,040,562	90.1	92.2	8.7	6.9	1.2	.9
Washington	79,156	38,045	93,530	99,253	23,792	63,130	196,478	200,428	196,478	200,428	40.3	19.0	47.6	49.5	12.1	31.5
West Virginia	72,220,925	66,661,991	26,081,064	31,556,469	2,515,453	1,712,658	100,817,442	99,931,118	101,300,772	100,281,677	71.6	66.7	25.9	31.6	2.5	1.7
Wyoming	252,249	232,801	41,328	37,106	33,190	39,576	326,767	309,483	328,625	309,483	77.2	75.2	12.6	12.0	10.2	12.8
Total	172,159,855	163,340,379	65,792,076	77,928,280	5,779,253	4,517,116	243,731,184	245,785,775	245,138,568	246,899,977	70.6	66.5	27.0	31.7	2.4	1.8

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.

TABLE 40.—Number of bituminous coal and lignite underground mines using mechanical loading devices and number of units in use in the United States by States

State	Number of mines										Number of loading devices							
											Loading machines							
	Using loading machines only [1]		Using continuous mining machines only		Using hand-loaded conveyors only		Using more than one type of mechanical loading		Total		Mobile		Scrapers and duckbills or other self-loading conveyors		Continuous mining machines		Hand-loaded conveyors (number of units)	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	15	15	------	------	15	9	5	6	35	30	109	125	------	4	20	19	72	69
Alaska	------	2	------	------	------	------	------	------	------	2	------	4	------	------	------	------	------	------
Arkansas	------	------	------	------	7	9	1	1	8	10	2	2	------	------	1	1	16	18
Colorado	35	34	2	3	16	17	7	7	60	61	55	56	34	36	13	14	45	44
Illinois	40	38	1	3	------	------	6	7	47	48	131	131	11	8	39	45	------	------
Indiana	17	16	------	------	------	------	2	3	19	19	82	67	------	------	4	7	------	------
Iowa	2	2	------	------	------	------	------	------	2	2	4	4	------	------	------	------	------	------
Kentucky	98	115	8	7	20	11	11	14	137	147	416	437	------	5	47	49	49	51
Maryland	------	------	------	------	9	10	------	------	9	10	------	------	------	------	------	------	21	22
Montana (bituminous)	7	6	------	------	1	2	------	------	8	8	7	8	5	6	------	------	2	4
New Mexico	------	------	------	1	1	------	1	------	2	1	2	------	------	------	3	3	1	------
Ohio	18	18	4	5	11	11	6	4	39	38	98	89	------	------	35	38	33	19
Oklahoma	------	------	------	------	5	6	1	1	6	7	6	4	------	------	------	------	79	83
Pennsylvania	68	61	17	29	108	96	52	41	245	227	577	479	56	52	306	337	295	229
Tennessee	10	18	1	1	4	19	1	1	16	39	28	37	12	12	1	2	14	40
Utah	37	35	------	1	------	------	6	6	43	42	132	132	3	3	22	25	------	------
Virginia	57	62	1	------	3	3	7	9	68	74	177	201	------	------	17	17	9	6
Washington	1	1	1	1	1	2	3	2	6	6	4	3	------	------	6	5	14	15
West Virginia	193	204	23	28	53	68	75	83	344	383	1,277	1,158	6	17	260	315	342	308
Wyoming	7	6	1	1	------	1	1	1	9	9	14	15	17	16	2	2	22	23
Total	605	633	59	80	254	264	185	186	1,103	1,163	3,121	2,952	144	159	776	879	1,014	931

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.

TABLE 41.—Production at bituminous coal and lignite underground mines in the United States by States and methods of loading

State	Hand loaded (net tons)		Mechanically loaded (net tons)		Total underground production (net tons)		Underground output hand loaded (percent)		Underground output mechanically loaded (percent)	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	553,550	685,491	8,619,099	9,679,849	9,172,649	10,365,340	6.0	6.6	94.0	93.4
Alaska	117,689	64,887		2,095	117,689	66,982	100.0	96.9		3.1
Arizona	7,284	5,526			7,284	5,526	100.0	100.0		
Arkansas	8,344		174,595	112,774	182,939	112,774	4.6		95.4	100.0
Colorado	326,965	300,773	2,415,349	2,613,664	2,742,314	2,914,437	11.9	10.3	88.1	89.7
Georgia	6,767	4,215			6,767	4,215	100.0	100.0		
Illinois	176,975	108,339	23,349,442	23,198,562	23,526,417	23,306,901	.8	.5	99.2	99.5
Indiana	107,324	87,952	4,536,694	4,664,950	4,644,018	4,752,902	2.3	1.9	97.7	98.1
Iowa	131,372	106,819	97,372	93,281	228,744	200,100	57.4	53.4	42.6	46.6
Kansas	6,059	3,584			6,059	3,584	100.0	100.0		
Kentucky	10,491,431	11,950,161	31,099,374	32,518,313	41,590,805	44,468,474	25.2	26.9	74.8	73.1
Maryland	168,170	162,960	126,173	97,238	294,343	260,198	57.1	62.6	42.9	37.4
Missouri	105,956	88,273			105,956	88,273	100.0	100.0		
Montana:										
Bituminous	13,269	8,019	130,097	96,708	143,366	104,727	9.3	7.7	90.7	92.3
Lignite	13,327	11,266			13,327	11,266	100.0	100.0		
Total Montana	26,596	19,285	130,097	96,708	156,693	115,993	17.0	16.6	83.0	83.4
New Mexico	49,275	46,273	67,553	203,489	116,828	249,762	42.2	18.5	57.8	81.5
North Dakota (lignite)	3,251	2,403			3,251	2,403	100.0	100.0		
Ohio	936,308	715,575	8,590,414	8,490,825	9,526,722	9,206,400	9.8	7.8	90.2	92.2
Oklahoma	5,317	3,766	339,972	243,802	345,289	247,568	1.5	1.5	98.5	98.5
Pennsylvania	2,899,187	2,683,984	41,742,978	41,386,576	44,642,165	44,070,560	6.5	6.1	93.5	93.9
Tennessee	2,345,558	1,802,395	1,865,577	2,136,231	4,211,135	3,938,626	55.7	45.8	44.3	54.2
Utah	10,425	10,267	4,534,132	4,944,426	4,544,557	4,954,693	.2	.2	99.8	99.8
Virginia	12,598,611	10,957,867	14,701,676	14,861,963	27,300,287	25,819,830	46.1	42.4	53.9	57.6
Washington	22,397	11,540	196,478	200,428	218,875	211,968	10.2	5.4	89.8	94.6
West Virginia	8,593,900	9,278,871	100,817,442	99,931,118	109,411,342	109,209,989	7.9	8.5	92.1	91.5
Wyoming	3,760	1,329	326,767	309,483	330,527	310,812	1.1	.4	98.9	99.6
Total	39,702,471	39,102,535	243,731,184	245,785,775	283,433,655	284,888,310	14.0	13.7	86.0	86.3

TABLE 42.—Units of mechanical loading equipment sold to bituminous coal and lignite mines for underground use in the United States, as reported by manufacturers

Type of equipment	1956	1957	1958	1959	1960	Change from 1959 (percent)
Mobile loading machines	239	209	97	95	110	+15.8
Continuous mining machines	154	168	107	140	128	−8.6
Scrapers			1			
Conveyors [1]	232	159	92	65	47	−27.7
Total	625	536	297	300	285	−5.0
Number of manufacturers reporting	22	21	18	17	18	

[1] Includes hand-loaded conveyors and those equipped with duckbills or other self-loading heads.

TABLE 43.—Units of mechanical loading equipment sold for use in bituminous coal and lignite mines in the United States, as reported by manufacturers, by States

State	Mobile loading machines		Continuous mining machines		Room conveyors [1]	
	1959	1960	1959	1960	1959	1960
Alabama	5	20	3	4	6	4
Arkansas			1	1		
Colorado		1	2	2		
Illinois		1	1	7		
Indiana	3		2	4		
Kentucky	5	22	3	7	2	1
Maryland		1				6
New Mexico	3		6			
Ohio	5	3	4	2	3	1
Pennsylvania	6	15	60	25	10	5
Tennessee				3	1	1
Utah		1	3	4		
Virginia	14	3		1	3	
West Virginia	54	43	55	68	40	29
Total	95	110	140	128	65	47

[1] Includes hand-loaded conveyors and those equipped with duckbills or other self-loading heads.

TABLE 44.—Units of conveying equipment sold for use in bituminous coal and lignite mines in the United States, as reported by manufacturers, by States

State	Bridge conveyors		Shuttle cars		Gathering and haulage conveyors [1]	
	1959	1960	1959	1960	1959	1960
Alabama	6	3	24	41	10	14
Alaska	------	------	------	------	5	------
Arkansas	1	1	------	------	------	------
Colorado	------	------	5	1	1	1
Illinois	------	1	3	10	1	10
Indiana	------	------	------	------	2	7
Kentucky	1	------	10	19	6	------
Maryland	------	2	------	------	------	1
New Mexico	------	------	6	------	1	------
Ohio	1	------	8	14	------	11
Oklahoma	------	------	------	------	2	------
Pennsylvania	10	18	43	45	16	13
Tennessee	2	2	------	------	2	------
Utah	------	------	------	11	2	1
Virginia	------	------	25	2	11	9
West Virginia	40	41	109	76	59	25
Total	61	68	233	219	118	92

[1] Includes all gathering and haulage conveyors with a capacity over 500 feet, except main-slope conveyors.

MECHANICAL CLEANING

Mechanical cleaning means cleaning raw coal with mechanical devices that separate out impurities, usually by differences in specific gravity, and does not include coal that is only screened. Mechanical devices are divided into two general classes—wet and pneumatic. About 93 percent of the coal cleaned in 1960 was cleaned by wet methods. The various types of mechanical cleaning equipment are described in detail in Minerals Yearbook, 1953.[5]

All coal mechanically cleaned in 1960 has been classified into seven types. The percentage of total production cleaned by each class was as follows: Jigs (50), dense-medium processes (24), concentrating tables (11), pneumatic (7), classifiers (4), launders (3), and flotation (1). Magnetite and sand were most commonly used as mediums in cleaning bituminous coal by the dense-medium processes. Magnetite was used in cleaning approximately 32 million tons, and sand was used in cleaning approximately 29 million tons.

Mechanical cleaning by froth flotation is shown separately for the first time. Thirty-one bituminous coal cleaning plants reported froth flotation cells in operation.

[5] Young, W. H., Anderson, R. L., and Hall, E. M., Coal-Bituminous and Lignite: Bureau of Mines Minerals Yearbook, 1953, vol. 2, 1956, pp. 94–96.

TABLE 45.—Growth of mechanical cleaning at bituminous coal and lignite mines in the United States

Year	Total production (thousand tons)	Mechanical cleaning: Number of cleaning plants	Mechanical cleaning: Raw coal (thousand tons)	Mechanical cleaning: Cleaned coal (thousand tons)	Mechanical cleaning: Refuse (thousand tons)	Mechanical cleaning: Percentage of refuse to raw coal	Percentage of total production mechanically cleaned
1927	517,763	(1)	(1)	27,692	(1)	(1)	5.3
1928	500,745	236	(1)	28,783	(1)	(1)	5.7
1929	534,989	280	40,241	36,799	3,442	8.6	6.9
1930	467,526	297	42,645	38,800	3,845	9.0	8.3
1931	382,089	312	39,529	36,172	3,357	8.5	9.5
1932	309,710	309	32,903	30,278	2,625	8.0	9.8
1933	333,630	290	37,682	34,558	3,124	8.3	10.4
1934	359,368	293	43,556	39,827	3,729	8.6	11.1
1935	372,373	320	49,473	45,361	4,112	8.3	12.2
1936	439,088	342	67,162	61,095	6,067	9.0	13.9
1937	445,531	(1)	(1)	65,000	(1)	(1)	14.6
1938	348,545	374	71,207	63,455	7,752	10.9	18.2
1939	394,855	366	88,895	79,429	9,466	10.6	20.1
1940	460,771	387	115,692	102,270	13,422	11.6	22.2
1941	514,149	417	133,379	117,540	15,839	11.9	22.9
1942	582,693	438	162,598	142,187	20,411	12.6	24.4
1943	590,177	432	167,310	145,576	21,734	13.0	24.7
1944	619,576	439	182,071	158,727	23,344	12.8	25.6
1945	577,617	439	172,899	147,886	25,013	14.5	25.6
1946	533,922	445	163,633	138,670	24,963	15.3	26.0
1947	630,624	461	206,620	174,436	32,184	15.6	27.7
1948	599,518	502	215,217	180,880	34,337	16.0	30.2
1949	437,868	571	184,691	153,652	31,039	16.8	35.1
1950	516,311	612	238,391	198,699	39,692	16.7	38.5
1951	533,665	631	289,838	241,010	49,828	17.2	45.0
1952	466,841	625	274,246	227,265	46,981	17.1	48.7
1953	457,290	611	295,654	241,759	53,895	18.2	52.9
1954	391,706	613	287,004	232,764	54,240	18.9	59.4
1955	464,633	575	335,458	272,715	62,743	18.7	58.7
1956	500,874	583	359,378	292,365	67,013	18.6	58.4
1957	492,704	593	376,546	304,027	72,519	19.3	61.7
1958	410,446	573	320,898	259,035	61,863	19.3	63.1
1959	412,028	555	337,138	269,787	67,351	20.0	65.5
1960	415,512	535	338,686	273,169	65,517	19.3	65.7

[1] Data not available.

TABLE 46.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1960, by States

State	Total production (net tons)	Mechanical cleaning: Number of cleaning plants	Raw coal (net tons)	Cleaned coal (net tons)	Refuse (net tons)	Percentage of refuse to raw coal	Percentage of total production mechanically cleaned
Alabama	13,010,647	36	17,931,099	11,612,481	6,318,618	35.2	89.3
Alaska	722,471	4	538,354	338,682	199,672	37.1	46.9
Arkansas	409,199	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	3,607,286	[2] 3	[2] 1,290,909	[2] 1,065,641	[2] 225,268	[2] 17.5	[2] 26.5
Illinois	45,977,486	59	49,778,188	41,684,769	8,093,419	16.3	90.7
Indiana	15,537,869	18	14,327,958	11,529,405	2,798,553	19.5	74.2
Kansas	888,274	4	1,266,762	823,035	443,727	35.0	92.7
Kentucky	66,846,492	82	54,221,591	44,740,661	9,480,930	17.5	66.9
Missouri	2,890,210	7	2,585,798	1,921,899	663,899	25.7	66.5
Montana (bituminous)	112,758	2	9,346	8,362	984	10.5	7.4
New Mexico	294,762	1	309,060	203,489	105,571	34.2	69.0
Ohio	33,956,772	22	18,084,789	15,216,802	2,867,987	15.9	44.8
Oklahoma	1,341,533	3	513,565	430,239	83,326	16.2	32.1
Pennsylvania	65,425,265	85	50,824,246	40,031,785	10,792,461	21.2	61.2
Utah	4,954,693	6	4,093,099	3,370,544	722,555	17.7	68.0
Virginia	27,837,895	28	16,000,285	13,277,391	2,722,894	17.0	47.7
Washington	228,145	5	329,919	223,361	106,558	32.3	97.9
West Virginia	118,944,277	168	106,532,928	86,643,899	19,889,029	18.7	72.8
Wyoming	2,024,196	2	47,706	46,249	1,457	3.1	2.3
Other States [3]	10,502,117						
Total	415,512,347	535	338,685,602	273,168,694	65,516,908	19.3	65.7

[1] Included in Colorado.
[2] Includes Arkansas.
[3] Includes Arizona, Georgia, Iowa, Maryland, Tennessee, and lignite from Montana, North Dakota, and South Dakota.

TABLE 47.—Mechanical cleaning of bituminous coal and lignite in the United States by types of equipment

Year	Wet methods [1]							Pneumatic methods	Grand total
	Jigs	Concentrating tables	Classifiers	Launders	Dense-medium processes	Unclassified	Total		
CLEAN COAL (THOUSAND NET TONS)									
1938	27,615	984	4,521	10,681	4,450	4,936	53,187	10,268	63,455
1939	37,056	1,402	5,917	12,809	4,683	5,867	67,734	11,695	79,429
1940	47,064	2,330	7,762	16,269	6,692	7,173	87,290	14,980	102,270
1941	53,287	2,510	8,177	16,954	9,344	10,106	100,378	17,162	117,540
1942	66,876	3,138	10,529	18,658	12,495	10,304	122,000	20,187	142,187
1943	66,092	2,929	11,854	17,424	13,388	12,688	124,375	21,201	145,576
1944	74,175	2,753	14,780	19,686	13,869	13,400	138,663	20,064	158,727
1945	68,609	2,594	14,203	18,980	12,875	13,209	130,470	17,416	147,886
1946	64,702	1,447	13,883	16,021	14,173	11,833	122,059	16,611	138,670
1947	85,931	2,980	14,648	17,902	17,702	16,920	156,083	18,353	174,436
1948	87,506	4,360	18,304	16,788	20,638	17,068	164,664	16,216	180,880
1949	72,423	4,040	14,865	11,238	17,821	20,321	140,708	12,944	153,652
1950	94,161	4,693	18,059	11,630	28,948	25,679	183,170	15,529	198,699
1951	101,746	5,811	23,174	10,362	33,840	46,497	221,430	18,580	240,010
1952	97,336	3,723	19,296	11,738	31,321	45,205	208,619	18,646	227,265
1953	101,001	4,002	18,312	11,988	36,805	50,386	222,494	19,265	241,759
1954	99,913	6,606	16,115	12,156	43,104	36,143	214,037	18,727	232,764
1955	114,538	7,443	17,656	11,400	49,332	52,051	252,420	20,295	272,715
1956	124,858	9,535	15,064	10,223	56,937	51,437	268,054	24,311	292,365
1957	133,844	14,389	14,282	8,306	63,678	44,760	279,259	24,768	304,027
1958	115,321	18,142	8,793	6,768	52,735	38,394	240,153	18,882	259,035
1959	126,836	27,453	8,935	7,305	66,951	14,058	251,538	18,249	269,787
1960	136,633	30,741	11,012	7,561	66,251	1,006	255,030	18,139	273,169
PERCENTAGE CLEANED									
1938	43.5	1.6	7.1	16.8	7.0	7.8	83.8	16.2	100.0
1939	46.6	1.8	7.5	16.1	5.9	7.4	85.3	14.7	100.0
1940	46.0	2.3	7.6	15.9	6.5	7.0	85.3	14.7	100.0
1941	45.3	2.2	7.0	14.4	7.9	8.6	85.4	14.6	100.0
1942	47.0	2.2	7.4	13.1	8.8	7.3	85.8	14.2	100.0
1943	45.4	2.0	8.1	12.0	9.2	8.7	85.4	14.6	100.0
1944	46.7	1.8	9.3	12.4	8.8	8.4	87.4	12.6	100.0
1945	46.4	1.8	9.6	12.8	8.7	8.9	88.2	11.8	100.0
1946	46.7	1.0	10.0	11.6	10.2	8.5	88.0	12.0	100.0
1947	49.3	1.7	8.4	10.3	10.1	9.7	89.5	10.5	100.0
1948	48.4	2.4	10.1	9.3	11.4	9.4	91.0	9.0	100.0
1949	47.1	2.6	9.7	7.3	11.6	13.3	91.6	8.4	100.0
1950	47.4	2.4	9.1	5.8	14.6	12.9	92.2	7.8	100.0
1951	42.4	2.4	9.7	4.3	14.1	19.4	92.3	7.7	100.0
1952	42.8	1.6	8.5	5.2	13.8	19.9	91.8	8.2	100.0
1953	41.8	1.6	7.6	4.9	15.2	20.9	92.0	8.0	100.0
1954	42.8	3.0	5.7	3.9	21.8	17.9	95.1	4.9	100.0
1955	42.0	2.7	6.5	4.2	18.1	19.1	92.6	7.4	100.0
1956	42.7	3.3	5.1	3.5	19.5	17.6	91.7	8.3	100.0
1957	44.0	4.8	4.7	2.7	21.0	14.7	91.9	8.1	100.0
1958	44.5	7.0	3.4	2.6	20.4	14.8	92.7	7.3	100.0
1959	47.0	10.2	3.3	2.7	24.8	5.2	93.2	6.8	100.0
1960	50.0	11.3	4.0	2.8	24.3	.3	93.4	6.6	100.0

[1] 1,826,000 net tons, 0.7 percent, was cleaned by flotation in 1960; data for other years not available.

TABLE 48.—Mechanical cleaning at bituminous coal and lignite mines in the United States by underground, strip, and auger mining

Year	Underground mines			Strip mines		
	Total production (net tons)	Cleaned		Total production (net tons)	Cleaned	
		Net tons	Percent		Net tons	Percent
1953	349,550,972	194,934,599	55.8	105,448,569	46,202,508	43.8
1954	289,112,031	184,372,053	63.8	98,134,250	47,772,295	48.7
1955	343,465,239	217,199,126	63.2	115,092,769	54,423,341	47.3
1956	365,774,043	232,231,914	63.5	127,055,382	58,271,513	45.9
1957	360,649,141	242,981,446	67.4	124,108,538	59,317,324	47.8
1958	286,884,244	198,710,828	69.3	116,241,787	58,932,257	50.7
1959	283,433,655	203,829,017	71.9	120,953,334	64,417,972	53.3
1960	284,888,310	205,804,076	72.2	122,629,664	66,356,125	54.1

Year	Auger mines			Total, all mines		
	Total production (net tons)	Cleaned		Total production (net tons)	Cleaned	
		Net tons	Percent		Net tons	Percent
1953	2,290,908	621,470	27.1	457,290,449	241,758,577	52.9
1954	4,460,019	619,675	13.9	391,706,300	232,764,023	59.4
1955	6,075,400	1,093,017	18.0	464,633,408	272,715,484	58.7
1956	8,044,652	1,861,957	23.1	500,874,077	292,365,384	58.4
1957	7,946,237	1,728,424	21.8	492,703,916	304,027,194	61.7
1958	7,319,516	1,391,766	19.0	410,445,547	259,034,851	63.1
1959	7,640,513	1,539,698	20.2	412,027,502	269,786,687	65.5
1960	7,994,373	1,008,493	12.6	415,512,347	273,168,694	65.7

TABLE 49.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1960, by States and by underground, strip, and auger mining

(Net tons)

State	Underground mines			Strip mines		
	Total production	Cleaned		Total production	Cleaned	
		Mechanically	Percent		Mechanically	Percent
Alabama	10,365,340	9,848,874	95.0	2,558,414	1,676,714	65.5
Alaska	66,982	-----	-----	655,489	338,682	51.7
Arkansas	112,774	(1)	(1)	296,425	(1)	(1)
Colorado	2,914,437	[2] 863,506	[2] 28.5	692,849	[2] 202,135	[2] 20.4
Illinois	23,306,901	19,697,651	84.5	22,670,585	21,987,118	97.0
Indiana	4,752,902	3,638,361	76.6	10,784,967	7,891,044	73.2
Kansas	3,584	-----	-----	884,690	823,035	93.0
Kentucky	44,468,474	28,725,238	64.6	19,672,192	15,917,170	80.9
Missouri	88,273	17,795	20.2	2,801,937	1,904,104	68.0
Montana (bituminous)	104,727	4,582	4.4	8,031	3,780	47.1
New Mexico	249,762	203,489	81.5	45,000	-----	-----
Ohio	9,206,400	6,759,432	73.4	23,883,289	8,411,740	35.2
Oklahoma	247,568	124,252	50.2	1,093,965	305,987	28.0
Pennsylvania	44,070,560	35,527,636	80.6	20,875,533	4,481,653	21.5
Utah	4,954,693	3,370,544	68.0	-----	-----	-----
Virginia	25,819,830	13,256,591	51.3	1,370,864	-----	-----
Washington	211,968	207,184	97.7	16,177	16,177	100.0
West Virginia	109,209,989	83,512,692	76.5	6,754,001	2,396,786	35.5
Wyoming	310,812	46,249	14.9	1,713,384	-----	-----
Other States [3]	4,422,334	-----	-----	5,851,872	-----	-----
Total	284,888,310	205,804,076	72.2	122,629,664	66,356,125	54.1

State	Auger mines			Total, all mines		
	Total production	Cleaned		Production	Cleaned	
		Mechanically	Percent		Mechanically	Percent
Alabama	86,893	86,893	100.0	13,010,647	11,612,481	89.3
Alaska	-----	-----	-----	722,471	338,682	46.9
Arkansas	-----	-----	-----	409,199	(1)	(1)
Colorado	-----	-----	-----	3,607,286	[2] 1,065,641	[2] 26.5
Illinois	-----	-----	-----	45,977,486	41,684,769	90.7
Indiana	-----	-----	-----	15,537,869	11,529,405	74.2
Kansas	-----	-----	-----	888,274	823,035	92.7
Kentucky	2,705,826	98,253	3.6	66,846,492	44,740,661	66.9
Missouri	-----	-----	-----	2,890,210	1,921,899	66.5
Montana (bitimunous)	-----	-----	-----	112,758	8,362	7.4
New Mexico	-----	-----	-----	294,762	203,489	69.0
Ohio	867,083	45,630	5.3	33,956,772	15,216,802	44.8
Oklahoma	-----	-----	-----	1,341,533	430,239	32.1
Pennsylvania	479,172	22,496	4.7	65,425,265	40,031,785	61.2
Utah	-----	-----	-----	4,954,693	3,370,544	68.0
Virginia	647,201	20,800	3.2	27,837,895	13,277,391	47.7
Washington	-----	-----	-----	228,145	223,361	97.9
West Virginia	2,980,287	734,421	24.6	118,944,277	86,643,899	72.8
Wyoming	-----	-----	-----	2,024,196	46,249	2.3
Other States [3]	227,911	-----	-----	10,502,117	-----	-----
Total	7,994,373	1,008,493	12.6	415,512,347	273,168,694	65.7

[1] Included in Colorado.
[2] Includes Arkansas.
[3] Includes Arizona, Georgia, Iowa, Maryland, Tennessee, and lignite from Montana, North Dakota, and South Dakota.

MECHANICAL CRUSHING

TABLE 50.—Mechanical crushing of bituminous coal and lignite at mines in the United States [1]

Year	Number of mines crushing coal	Coal crushed (net tons)	Percentage of production crushed at mines where crushing is done	Percentage of total production crushed	Percentage of production mechanically cleaned at mines where crushing is done
1940	716	35,251,061	19.3	7.7	(2)
1944	814	66,460,564	29.6	10.8	(2)
1945	830	70,936,898	32.4	12.3	(2)
1946	851	66,663,732	31.8	12.5	39.9
1947	904	88,985,858	35.7	14.1	41.4
1948	995	91,564,311	36.6	15.3	42.1
1949	1,120	77,327,691	39.0	17.7	47.3
1950	1,210	101,594,731	40.1	19.7	50.6
1951	1,374	118,663,712	39.6	22.2	54.8
1952	1,325	108,102,158	40.5	23.2	59.6
1953	1,239	116,493,415	42.5	25.5	62.7
1954	982	122,288,369	51.8	31.2	69.8
1955	1,225	161,470,318	52.8	34.8	68.4
1956	1,370	172,389,802	54.6	34.4	68.0
1957	1,452	173,098,257	52.5	35.0	70.5
1958	1,359	146,749,108	53.8	35.8	74.5
1959	1,393	151,225,633	51.9	36.7	74.3
1960	1,348	160,875,418	55.1	38.7	74.3

[1] Data not available for 1941–43. Lignite and Virginia semianthracite mines are not included in 1940–49.
[2] Data not available.

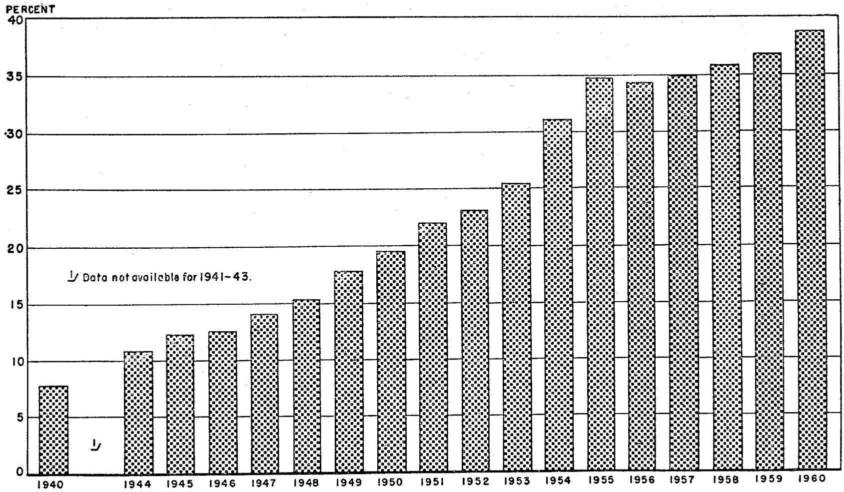

FIGURE 11.—Percentage of total production of bituminous coal and lignite crushed at mines in the United States, 1940 and 1944–60.

TABLE 51.—Mechanical crushing of bituminous coal and lignite at mines in the United States by States

State	Number of mines crushing coal		Coal crushed (net tons)		Percentage of production crushed at mines where crushing is done		Percentage of total production crushed	
	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	26	30	6,522,634	6,451,821	68.4	62.0	54.6	49.6
Alaska	8	6	452,013	416,243	68.5	98.6	68.5	57.6
Arizona	1	1	3,923	3,820	90.7	95.6	53.9	69.1
Arkansas	12	11	354,989	319,416	95.2	99.6	80.4	78.1
Colorado	50	44	1,549,780	1,592,168	61.0	67.3	47.0	44.1
Illinois	75	83	18,651,330	18,912,562	45.6	45.4	41.0	41.1
Indiana	34	32	7,992,812	8,197,634	57.0	54.8	54.0	52.8
Iowa	24	23	773,874	722,773	83.1	76.9	65.6	67.7
Kansas	4	4	502,633	586,892	98.5	99.1	65.1	66.1
Kentucky	168	122	24,677,924	24,382,886	59.0	64.3	39.3	36.5
Maryland	16	15	335,441	268,491	81.6	78.7	39.8	35.9
Missouri	12	10	1,728,344	1,078,549	70.3	58.2	62.9	37.3
Montana:								
Bituminous	5	7	54,600	41,564	48.1	47.9	35.8	36.9
Lignite								
Total Montana	5	7	54,600	41,564	48.1	47.9	15.8	13.3
New Mexico	6	4	105,501	250,643	88.1	94.1	71.0	85.0
North Dakota (lignite)	13	12	1,140,894	1,239,758	93.9	66.5	47.3	49.1
Ohio	138	131	13,294,292	13,094,162	47.2	51.6	37.9	38.6
Oklahoma	10	12	881,355	810,801	89.1	89.4	57.8	60.4
Pennsylvania	359	328	28,894,657	31,356,577	60.5	66.9	44.2	47.9
South Dakota (lignite)	1	1	5,000	5,858	22.6	28.6	22.6	28.6
Tennessee	19	25	541,969	720,958	64.8	51.5	9.2	12.2
Utah	38	39	2,965,121	3,512,355	66.7	71.8	65.2	70.9
Virginia	49	72	4,924,662	8,704,837	57.4	61.6	16.5	31.3
Washington	8	5	28,726	41,800	12.7	22.5	14.3	18.3
West Virginia	308	320	33,390,317	36,656,275	40.1	44.4	27.9	30.8
Wyoming	9	11	1,452,842	1,506,575	84.7	84.1	73.5	74.4
Total	1,393	1,348	151,225,633	160,875,418	51.9	55.1	36.7	38.7

TREATMENT FOR ALLAYING DUST

TABLE 52.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States [1]

Year	Grand total production (net tons)	Total production at mines where coal was treated (net tons)	Percentage of production treated at mines where treating is done	Percentage of total production treated
1940	460,771,500	161,089,959	22.1	7.7
1941	514,149,245	197,476,343	20.0	7.7
1942	582,692,937	202,973,885	17.3	6.0
1943	590,177,069	153,863,052	17.3	4.5
1944	619,576,240	172,955,108	17.8	5.0
1945	577,617,327	166,935,955	20.1	5.8
1946	533,922,068	166,814,848	22.2	6.9
1947	630,623,722	195,840,059	26.4	8.2
1948	599,518,229	196,600,489	25.6	8.4
1949	437,868,036	160,978,742	26.0	9.5
1950	516,311,053	210,083,657	25.9	10.5
1951	533,664,732	228,802,637	25.6	11.0
1952	466,840,782	211,437,141	24.4	11.0
1953	457,290,449	206,374,498	23.7	10.7
1954	391,706,300	202,098,539	27.9	14.4
1955	464,633,408	236,115,318	26.5	13.5
1956	500,874,077	243,513,231	26.6	12.9
1957	492,703,916	241,733,935	25.6	12.5
1958	410,445,547	188,245,095	28.3	13.0
1959	412,027,502	213,407,336	25.6	13.3
1960	415,512,347	221,644,878	26.0	13.9

Year	Net tons treated with—				
	Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	2,633,291	25,767,651	4,428,113	2,807,728	35,636,783
1941	3,957,459	29,258,462	2,482,899	3,844,476	39,543,296
1942	10,132,809	11,302,020	6,544,658	7,148,064	35,127,551
1943	15,049,176	1,720,176	1,947,219	7,966,484	26,683,055
1944	7,276,702	13,188,883	4,744,580	5,562,565	30,772,730
1945	5,115,090	18,875,674	4,647,872	4,910,602	33,549,238
1946	4,957,622	24,310,109	3,193,070	4,572,360	37,033,161
1947	5,822,483	34,667,571	5,571,953	5,732,101	51,794,108
1948	6,275,121	34,466,534	4,177,987	5,462,054	50,381,696
1949	3,670,120	30,448,670	4,380,961	3,275,151	41,774,902
1950	4,643,186	41,688,159	4,278,212	3,724,314	54,333,871
1951	4,694,938	46,142,726	4,587,940	3,172,205	58,597,809
1952	4,954,080	41,409,886	3,432,199	1,772,111	51,568,276
1953	3,362,552	40,671,431	2,769,833	2,154,985	48,958,801
1954	2,959,979	47,782,165	3,366,955	2,255,872	56,364,971
1955	3,160,729	51,157,769	5,696,447	2,513,752	62,528,697
1956	5,500,522	52,008,545	4,912,374	2,309,732	64,731,173
1957	4,112,934	52,051,076	3,809,132	1,852,051	61,825,193
1958	3,359,434	42,922,129	4,122,397	2,862,670	53,266,630
1959	2,716,638	45,139,888	3,419,852	3,403,320	54,679,698
1960	4,576,176	46,241,261	4,333,350	2,469,508	57,620,295

Year	Number of mines treating with—					Year	Percentage of tonnage treated with—				
	Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total [2]		Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	51	486	22	62	614	1940	7.4	72.3	12.4	7.9	100.0
1941	67	564	15	58	668	1941	10.0	74.0	6.3	9.7	100.0
1942	167	334	73	117	603	1942	28.8	32.2	18.6	20.4	100.0
1943	212	67	28	101	393	1943	56.4	6.4	7.3	29.9	100.0
1944	145	192	47	83	434	1944	23.6	42.9	15.4	18.1	100.0
1945	105	296	43	67	487	1945	15.2	56.3	13.9	14.6	100.0
1946	79	380	41	51	546	1946	13.4	65.6	8.6	12.4	100.0
1947	67	384	58	45	546	1947	11.2	66.9	10.8	11.1	100.0
1948	68	474	48	46	629	1948	12.5	68.4	8.3	10.8	100.0
1949	91	586	62	34	769	1949	8.8	72.9	10.5	7.8	100.0
1950	106	688	32	45	838	1950	8.5	76.7	7.9	6.9	100.0
1951	98	764	40	27	898	1951	8.0	78.8	7.8	5.4	100.0
1952	101	723	30	20	865	1952	9.6	80.3	6.7	3.4	100.0
1953	81	681	28	26	785	1953	6.8	83.1	5.7	4.4	100.0
1954	83	614	29	29	737	1954	5.2	84.8	6.0	4.0	100.0
1955	63	650	33	28	757	1955	5.1	81.8	9.1	4.0	100.0
1956	73	642	35	30	763	1956	8.5	80.3	7.6	3.6	100.0
1957	71	665	31	34	785	1957	6.6	84.2	6.2	3.0	100.0
1958	60	596	36	33	720	1958	6.3	80.6	7.7	5.4	100.0
1959	54	615	44	37	743	1959	5.0	82.6	6.2	6.2	100.0
1960	64	635	56	26	748	1960	7.9	80.3	7.5	4.3	100.0

[1] All items except "Grand total production" exclude lignite and semianthracite, 1940–49. Data for 1940–45 include all mines with an average daily production of 50 tons and all mines with rail or river connections regardless of size. Data for 1946–60 include all mines producing 1,000 or more tons. The figures are reasonably comparable for all years.

[2] Because some mines used more than 1 method of treatment, this total is not the sum of the individual items.

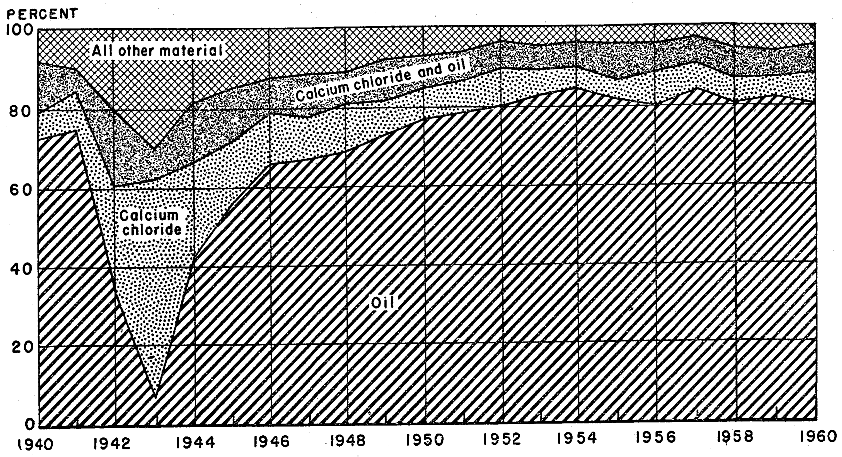

FIGURE 12.—Percentage of total bituminous coal and lignite treated for allaying dust at mines in the United States, 1940–60, by type of agent used.

TABLE 53.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States by States

State	Number of mines treating coal		Coal treated (net tons)		Percentage of production treated at mines where treating is done		Percentage of total production treated	
	1959	1960	1959	1960	1959	1960	1959	1960
Alabama	3	8	62,000	86,150	26.8	24.6	0.5	0.7
Arkansas	3	5	2,130	5,577	2.8	11.3	.5	1.4
Colorado	45	41	256,422	258,419	17.8	18.3	7.8	7.2
Illinois	75	80	4,917,588	4,917,042	12.3	11.4	10.8	10.7
Indiana	26	26	1,258,808	1,208,527	12.2	10.6	8.5	7.8
Iowa	6	5	15,499	12,850	10.1	10.3	1.3	1.2
Kansas	2	2	32,656	34,626	5.2	4.4	4.2	3.9
Kentucky	124	99	15,344,908	14,933,416	45.0	41.2	24.4	22.3
Maryland	5	3	23,000	43,919	55.1	58.2	2.7	5.9
Missouri	7	6	84,324	83,473	6.9	7.2	3.1	2.9
Montana:								
Bituminous	7	8	25,652	32,784	20.8	35.4	16.8	29.1
Lignite	1	1	10,000	12,000	5.7	6.4	5.2	6.0
Total Montana	8	9	35,652	44,784	11.9	16.0	10.3	14.3
North Dakota (lignite)	15	18	742,701	801,091	32.7	33.6	30.8	31.7
Ohio	42	40	4,718,892	4,665,001	26.8	30.8	13.4	13.7
Oklahoma	4	5	71,259	67,417	31.0	18.3	4.7	5.0
Pennsylvania	111	107	6,155,736	6,576,280	26.2	27.8	9.4	10.1
South Dakota (lignite)	1	1	4,850	5,858	21.9	28.6	21.9	28.6
Tennessee	3	1	6,050	2,000	5.1	4.7	.1	.1
Utah	40	35	1,634,515	2,710,114	48.1	68.5	36.0	54.7
Virginia	35	46	2,759,912	3,327,432	30.0	27.5	9.3	12.0
Washington		1		478		.4		.2
West Virginia	174	197	16,308,979	17,595,973	24.3	26.1	13.6	14.8
Wyoming	14	13	243,817	239,868	16.9	16.9	12.3	11.9
Total	743	748	54,679,698	57,620,295	25.6	26.0	13.3	13.9

THERMAL DRYING

Because most of the bituminous coal produced in the United States is either sprayed with water underground to reduce the dust in mining, cleaned by wet methods, or subjected to wet screening in the tipple, the problem of removing surface moisture from the coal is vital. The moisture must be removed from bituminous coal for any one or a combination of the following reasons: (1) To avoid freezing difficulties and to facilitate handling the coal during shipment and transfer to the firebox; (2) to reduce the heat wasted in evaporation of surface moisture on the coal, thus increasing efficiency in burning; (3) to decrease transportation costs; (4) to improve the coal so that it may be used for specific purposes, such as producing coke and briquets; and (5) to facilitate drycleaning.

Removal of surface water from fine bituminous coal usually presents an individual problem at each preparation plant. Fine coal has a greater surface area per unit weight than coarse coal; therefore, its capacity for retaining moisture is proportionately greater. Removing water from coarse coal is relatively easy, but the problem is greater with coal that is 10-mesh or finer. [6]

The two components of the total moisture content of wetwashed coal are inherent and surface moisture. Inherent moisture is present in the coal in the bed. Surface moisture is attached to the surface of the coal particles or retained in cracks and fissures other than capillary openings in the coal substance.

There are three principal methods of removing surface moisture from coal: (1) Gravity drainage, (2) mechanical dewatering, and (3) thermal drying. Thermal drying is generally used on coals that cannot be readily dried by gravity drainage or mechanical means, such as screens, centrifuges, and filters.

The annual reports of bituminous coal and lignite producers to the Bureau of Mines for 1957 included data on thermal drying for the first time. These and succeeding reports have included data on thermal drying only at the preparation plant and have not included thermal drying at powerplants or other industrial plants.

Thermal driers have been arranged into six groups: (1) Rotary, (2) screen, (3) vertical tray and cascade, (4) continuous carrier, (5) suspension or flash (including fluidized-bed), and (6) multilouvre driers. A few producers did not furnish figures by type of equipment, and estimates were made for these plants.

Each type of thermal drier has been designed to handle a definite range of sizes of coal. The sizes of coal most commonly reported as thermally dried in 1960 were ¼ by 0 inch and ⅜ by 0 inch.

Table 55 compares, by States, thermally dried with mechanically cleaned bituminous coal. In nine States, mines that operated bituminous coal cleaning plants in 1960 did no thermal drying.

Thermal drying of bituminous coal by States in 1959–60 is shown in table 56. Bituminous coal thermally dried amounted to 38 million tons, or 9 percent of the total production in the United States.

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[6] Lyons, Orville R., Dewatering and Thermal Drying: AIME Coal Preparation, 1950, pp. 648–715.

TABLE 54.—Thermal drying of bituminous coal and lignite in the United States, by type of drying equipment

Type of drier	Number of thermal drying units		Net tons thermally dried		Percentage of total	
	1959	1960	1959	1960	1959	1960
Rotary	9	11	717, 948	771, 014	2.0	2.0
Screen	61	57	7, 458, 410	7, 205, 523	20.9	19.0
Vertical tray and cascade	57	58	5, 682, 861	5, 023, 497	15.9	13.3
Continuous carrier	5	6	922, 922	894, 304	2.6	2.4
Suspension or flash, including fluidized-bed	60	63	11, 247, 701	12, 504, 527	31.4	33.0
Multilouvre	55	57	9, 734, 894	11, 469, 532	27.2	30.3
Total	247	252	35, 764, 736	37, 868, 397	100.0	100.0

TABLE 55.—Comparison of thermal drying of bituminous coal and lignite with mechanical cleaning at mines in the United States by States

State	Total number of cleaning plants		Number of cleaning plants with thermal drying		Production mechanically cleaned (net tons)		Thermally dried (net tons)		Percentage of cleaned coal thermally dried	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Illinois	58	59	18	21	43, 410, 877	41, 684, 769	4, 476, 607	5, 471, 849	10.3	13.1
Indiana	20	18	11	11	10, 390, 104	11, 529, 405	2, 289, 895	2, 857, 669	22.0	24.8
Kentucky	81	82	8	9	42, 070, 715	44, 740, 661	2, 257, 854	2, 686, 688	5.4	6.0
Ohio	23	22	5	6	15, 897, 365	15, 216, 802	1, 693, 240	1, 655, 739	10.7	10.9
Pennsylvania	89	85	12	9	38, 921, 850	40, 031, 785	3, 766, 257	3, 353, 139	9.7	8.4
Utah	6	6	3	4	2, 998, 015	3, 370, 544	544, 590	1, 309, 832	18.2	38.9
Virginia	29	28	5	4	14, 030, 556	13, 277, 391	4, 100, 214	3, 610, 426	29.2	27.2
Washington	5	5	2	2	230, 571	223, 361	72, 000	96, 000	31.2	43.0
West Virginia	184	168	40	42	86, 523, 323	86, 643, 899	16, 564, 079	16, 827, 055	19.1	19.4
Other States	60	62	------	------	15, 313, 311	16, 450, 077	------------	------------	------	------
Total	555	535	104	108	269, 786, 687	273, 168, 694	35, 764, 736	37, 868, 397	13.3	13.9

TABLE 56.—Thermal drying of bituminous coal and lignite at mines in the United States by States

State	Number of thermal drying units		Grand total production (net tons)		Thermally dried (net tons)		Percentage of total production thermally dried	
	1959	1960	1959	1960	1959	1960	1959	1960
Illinois	44	50	45, 465, 616	45, 977, 486	4, 476, 607	5, 471, 849	9.8	11.9
Indiana	30	31	14, 803, 501	15, 537, 869	2, 289, 895	2, 857, 669	15.5	18.4
Kentucky	13	15	62, 809, 849	66, 846, 492	2, 257, 854	2, 686, 688	3.6	4.0
Ohio	16	17	35, 111, 980	33, 956, 772	1, 693, 240	1, 655, 739	4.8	4.9
Pennsylvania	27	25	65, 347, 088	65, 425, 265	3, 766, 257	3, 353, 139	5.8	5.1
Utah	3	4	4, 544, 557	4, 954, 693	544, 590	1, 309, 832	12.0	26.4
Virginia	19	18	29, 768, 840	27, 837, 895	4, 100, 214	3, 610, 426	13.8	13.0
Washington	3	3	242, 318	228, 145	72, 000	96, 000	29.7	42.1
West Virginia	92	89	119, 692, 129	118, 944, 277	16, 564, 079	16, 827, 055	13.8	14.1
Other States	--------	--------	34, 241, 624	35, 803, 453	------------	------------	--------	--------
Total	247	252	412, 027, 502	415, 512, 347	35, 764, 736	37, 868, 397	8.7	9.1

PRODUCTION BY STATES AND COUNTIES

Detailed production and employment statistics are shown in table 57 for each coal-producing county in the United States from which three or more operators submitted reports for 1960. Statistics on counties with less than three reporting producers have been combined with data for "Other counties" to avoid disclosing individual figures, except when the Bureau has been granted permission to publish statistics separately. Production of mines on the border between two States has been credited to the State in which the coal was mined rather than to the State in which the tipple was located. If the coal was mined in both States, the tonnage was apportioned accordingly.

Bituminous coal and lignite were mined in 26 States and 327 counties. As soft coal is the source of a large part of the economic activity in many counties, the key items pertaining to the industry are published by counties and are useful in analyzing potential markets. These key items are (1) method of shipping the coal, (2) value, (3) number of men working daily, (4) days worked, and (5) tons per man per day.

The most striking fact illustrated by the following table is the wide variation among several counties in the same State, not only in production but also in average value and average tons per man per day. The differences in average value are due to quality of coal, method of mining, method of transportation, or market conditions. The differences in output per man per day are caused mostly by physical conditions, mining methods, and extent of mechanization.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ALABAMA									
Bibb	15,179	4,660	----------	19,839	$4.57	31	107	3,318	5.98
Blount	70,484	90,204	----------	160,688	6.20	55	206	11,344	14.17
Cullman	49,680	17,256	----------	66,936	6.20	54	155	8,371	8.00
Jackson	----------	8,122	----------	8,122	5.01	10	110	1,100	7.38
Jefferson	7,684,939	245,751	14,004	7,944,694	7.63	4,875	213	1,039,765	7.64
Marion	118,565	89,673	----------	208,238	5.96	242	197	47,646	4.37
Shelby	6,800	50,746	----------	57,546	6.73	85	201	17,076	3.37
Tuscaloosa	699,535	500	1,288	701,323	4.26	453	141	63,815	10.99
Walker	2,259,750	62,070	1,393,587	3,715,407	6.76	1,568	193	303,338	12.25
Winston	63,927	63,927	----------	127,854	4.50	32	218	6,990	18.29
Total Alabama	10,968,859	632,909	1,408,879	13,010,647	7.10	7,405	203	1,502,763	8.66
ALASKA									
Total Alaska	716,585	2,938	2,948	722,471	$8.75	214	251	53,626	13.47

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day[4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ARIZONA									
Coconino	----------	1,531	----------	1,531	$10.50	11	160	1,760	.87
Navajo	----------	3,995	----------	3,995	10.50	7	139	970	4.12
Total Arizona	----------	5,526	----------	5,526	10.50	18	152	2,730	2.02
ARKANSAS									
Franklin	117,127	----------	----------	117,127	$6.67	20	234	4,689	24.98
Johnson	112,805	----------	----------	112,805	7.88	127	98	12,429	9.08
Logan	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pope	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sebastian	94,404	7,350	----------	101,754	8.52	215	106	22,854	4.45
Other counties	77,513	----------	----------	77,513	7.45	80	110	8,794	8.81
Total Arkansas	401,849	7,350	----------	409,199	7.61	442	110	48,766	8.39
COLORADO									
Delta	35,755	33,363	775	69,893	$5.37	55	169	9,307	7.51
El Paso	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fremont	10,129	288,848	50	299,027	3.55	139	181	25,125	11.90
Garfield	----------	14,798	----------	14,798	7.50	24	161	3,864	3.83
Gunnison	220,238	45,552	4,850	270,640	5.51	207	157	32,451	8.34
Huerfano	13,593	46,759	----------	60,352	6.36	66	154	10,160	5.94
Jackson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
La Plata	5,798	24,848	----------	30,646	4.17	27	180	4,872	6.29
Las Animas	668,143	26,471	2,984	697,598	9.25	947	156	147,796	4.72
Mesa	----------	15,040	92,157	107,197	5.46	68	209	14,198	7.55
Moffat	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Montrose	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pitkin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rio Blanco	----------	11,106	----------	11,106	4.99	6	196	1,178	9.43
Routt	428,620	38,069	826	467,515	4.03	108	197	21,309	21.94
Weld	514,765	218,205	8,535	741,505	4.34	250	217	54,283	13.66
Other counties	638,091	198,907	11	837,009	6.39	273	226	61,594	13.59
Total Colorado	2,535,132	961,966	110,188	3,607,286	5.85	2,170	178	386,137	9.34
GEORGIA									
Walker	----------	4,215	----------	4,215	$5.00	12	191	2,291	1.84
ILLINOIS									
Adams	----------	37,400	220	37,620	$7.13	16	172	2,748	13.69
Bureau	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Christian	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clinton	15,901	34,757	14,477	65,135	4.30	124	169	21,011	3.10
Douglas	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Franklin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fulton	4,944,958	387,387	11,812	5,344,157	4.15	816	256	208,987	25.57
Gallatin	48,433	37,918	500	86,851	3.41	42	202	8,472	10.25
Greene	----------	7,062	----------	7,062	5.39	2	240	480	14.71
Henry	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Jackson	1,254,006	56,699	3,996	1,314,701	3.84	307	243	74,662	17.61
Jefferson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons): Shipped by rail or water [1]	Production (net tons): Shipped by truck	Production (net tons): Used at mine [2]	Production (net tons): Total	Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
ILLINOIS—Continued									
Kankakee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Knox	2,220,339	----------	----------	2,220,339	4.09	292	129	37,646	58.98
Logan	----------	17,443	40	17,483	5.81	23	121	2,779	6.29
Macoupin	295,970	60,042	2,159	358,171	4.15	158	194	30,587	11.71
Madison	57,638	605,604	4,626	667,868	4.26	313	204	63,850	10.46
Menard	----------	12,970	----------	12,970	5.42	17	153	2,594	5.00
Mercer	10,200	17,031	----------	27,231	5.19	16	191	3,063	8.89
Montgomery	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Peoria	122,379	310,253	805	433,437	5.11	120	198	23,732	18.26
Perry	2,673,112	152,187	3,990	2,829,289	3.63	274	287	78,631	35.98
Randolph	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
St. Clair	3,324,681	1,513,961	4,714	4,843,356	3.69	877	156	136,563	35.47
Saline	2,907,886	49,275	7,953	2,965,114	4.05	718	204	146,586	20.23
Sangamon	----------	98,115	400	98,515	4.50	76	189	14,340	6.87
Schuyler	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Stark	170,350	----------	----------	170,350	4.32	67	192	12,896	13.21
Vermilion	808,229	286,659	3,021	1,097,909	4.46	181	236	42,627	25.76
Wabash	----------	1,133	----------	1,133	5.00	1	113	113	10.03
Washington	7,878	23,970	665	32,513	4.66	49	137	6,704	4.85
Will	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Williamson	6,007,986	240,882	10,217	6,259,085	3.99	1,350	234	315,449	19.84
Other counties	15,575,848	1,450,611	60,738	17,087,197	4.02	3,896	218	861,183	19.29
Total Illinois	40,445,794	5,401,359	130,333	45,977,486	4.00	9,735	215	2,095,703	21.94
INDIANA									
Clay	584,889	292,342	2,294	879,525	$4.09	183	247	45,163	19.47
Daviess	----------	38,771	----------	38,771	5.18	17	180	3,060	12.67
Dubois	----------	18,050	----------	18,050	4.01	15	162	2,426	7.44
Fountain	----------	11,265	25	11,290	6.36	17	75	1,289	8.76
Gibson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Greene	1,386,639	67,640	3,687	1,457,966	4.19	342	213	72,771	20.03
Knox	830,780	58,715	2,769	892,264	3.92	311	196	60,824	14.67
Owen	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Parke	----------	20,026	----------	20,026	5.78	8	201	1,603	12.49
Pike	1,771,823	134,625	1,455	1,907,903	3.86	375	245	91,785	20.79
Spencer	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sullivan	1,172,267	214,102	3,291	1,389,660	4.15	487	220	107,380	12.94
Vermillion	----------	23,374	----------	23,374	5.98	37	85	3,155	7.41
Vigo	1,575,936	217,172	664,980	2,458,088	4.39	725	241	174,936	14.05
Warrick	5,317,901	256,069	5,953	5,579,923	3.59	572	234	133,786	41.71
Other counties	658,711	178,219	24,099	861,029	4.43	407	159	64,900	13.27
Total Indiana	13,298,946	1,530,370	708,553	15,537,869	3.96	3,496	218	763,078	20.36
IOWA									
Appanoose	8,555	48,968	701	58,224	$5.47	147	154	22,567	2.58
Keokuk	----------	2,987	----------	2,987	5.00	4	150	600	4.98
Lucas	19,943	21,747	----------	41,690	4.06	19	292	5,549	7.51
Mahaska	182,933	71,873	----------	254,806	3.28	59	283	16,716	15.24
Marion	427,666	164,453	425	592,544	3.50	147	224	32,898	18.01
Monroe	29,822	22,965	20	52,807	3.29	49	133	6,523	8.10
Van Buren	----------	15,869	----------	15,869	5.25	10	180	1,799	8.82
Wapello	----------	49,089	8	49,097	3.58	23	242	5,572	8.81
Total Iowa	668,919	397,951	1,154	1,068,024	3.60	458	201	92,224	11.58

See footnotes at end of table.

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TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons): Shipped by rail or water [1]	Production (net tons): Shipped by truck	Production (net tons): Used at mine [2]	Production (net tons): Total	Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
KANSAS									
Bourbon	----------	4,206	----------	4,206	$3.94	3	200	600	7.01
Cherokee	459,775	123,882	1,100	584,757	4.66	114	277	31,557	18.53
Coffey	----------	2,046	----------	2,046	4.73	2	144	288	7.10
Crawford	249,653	42,490	302	292,445	4.81	92	208	19,107	15.31
Osage	----------	4,820	----------	4,820	7.76	15	109	1,636	2.95
Total Kansas	709,428	177,444	1,402	888,274	4.73	226	235	53,188	16.70
KENTUCKY									
Eastern Kentucky:									
Bell	1,284,234	208,430	871	1,493,535	$3.90	716	141	100,971	14.79
Boyd	----------	25,121	880	26,001	4.77	16	244	3,904	6.66
Breathitt	477,244	75,730	707	553,681	6.08	265	231	61,113	9.06
Carter	----------	18,600	----------	18,600	5.15	25	149	3,720	5.00
Clay	817,725	466,148	248	1,284,121	3.63	1,162	170	197,131	6.51
Clinton	----------	38,432	----------	38,432	4.00	49	166	8,125	4.73
Elliott	----------	16,200	787	16,987	3.39	21	204	4,290	3.96
Floyd	3,969,399	301,801	6,955	4,278,155	6.00	2,468	180	445,448	9.60
Harlan	6,023,180	199,614	12,807	6,235,601	5.61	3,968	164	652,042	9.56
Jackson	31,584	94,142	----------	125,726	3.47	250	104	25,893	4.86
Johnson	196,043	61,492	----------	257,535	3.34	311	121	37,596	6.85
Knott	976,032	376,360	----------	1,352,392	3.12	1,049	121	126,533	10.69
Knox	182,599	60,127	213	242,939	3.43	578	72	41,489	5.86
Laurel	26,689	83,179	206	110,074	3.44	167	103	17,264	6.38
Lawrence	----------	44,808	----------	44,808	3.43	55	127	6,977	6.42
Lee	26,146	28,194	----------	54,340	5.07	57	186	10,615	5.12
Leslie	1,911,048	378,089	1,654	2,290,791	4.42	1,546	162	250,040	9.16
Letcher	3,752,181	475,709	16,942	4,244,832	5.51	1,970	174	342,939	12.38
McCreary	404,422	112,704	----------	517,126	3.79	221	262	57,963	8.92
Magoffin	51,174	22,000	----------	73,174	1.96	65	96	6,222	11.76
Martin	33,053	2,000	----------	35,053	3.40	54	88	4,769	7.35
Menifee	----------	1,300	----------	1,300	5.15	7	46	325	4.00
Morgan	----------	37,669	23	37,692	3.41	143	51	7,229	5.21
Owsley	124,800	1,750	----------	126,550	4.03	92	95	8,758	14.45
Perry	4,288,192	149,170	3,737	4,441,099	4.37	1,955	188	366,822	12.11
Pike	6,751,903	854,522	13,061	7,619,486	4.61	3,747	168	628,906	12.12
Pulaski	70,703	83,001	----------	153,704	4.02	101	159	16,082	9.56
Rockcastle	30,588	8,000	----------	38,588	3.77	46	148	6,830	5.65
Wayne	----------	9,057	----------	9,057	6.31	7	194	1,360	6.66
Whitley	370,441	152,728	211	523,380	3.53	604	170	102,905	5.09
Wolfe	----------	15,125	----------	15,125	5.00	23	158	3,627	4.17
Total Eastern Kentucky	31,799,380	4,401,202	59,302	36,259,884	4.84	21,738	163	3,547,888	10.22
Western Kentucky:									
Butler	----------	213,552	----------	213,552	4.50	83	160	13,250	16.12
Caldwell	45,885	----------	----------	45,885	3.00	19	201	3,824	12.00
Christian	70,348	----------	----------	70,348	5.75	36	130	4,690	15.00
Daviess	784,545	183,162	----------	967,707	3.47	88	282	24,822	38.99
Hancock	----------	118,311	----------	118,311	3.26	39	152	5,916	20.00
Henderson	----------	292,128	9,081	301,209	3.19	165	208	34,385	8.76
Hopkins	11,422,617	395,692	232	11,818,541	3.60	2,758	209	576,117	20.51
McLean	----------	58,000	----------	58,000	3.26	19	204	3,867	15.00
Muhlenberg	9,843,240	73,077	2,342	9,918,659	3.32	1,424	224	318,368	31.15
Ohio	3,200,269	38,977	----------	3,239,246	3.29	328	236	77,279	41.92
Union	2,812,361	20,066	349	2,832,776	3.98	708	234	165,557	17.11
Webster	980,030	22,344	----------	1,002,374	3.22	234	203	47,535	21.09
Total Western Kentucky	29,159,295	1,415,309	12,004	30,586,608	3.49	5,901	216	1,275,610	23.98
Total Kentucky	60,958,675	5,816,511	71,306	66,846,492	4.22	27,639	175	4,823,498	13.86

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
MARYLAND									
Allegany	55, 202	142, 897	20	198, 119	$3. 91	210	147	30, 894	6. 41
Garrett	246, 511	303, 204	----------	549, 715	3. 68	362	166	60, 134	9. 14
Total Maryland	301, 713	446, 101	20	747, 834	3. 74	572	159	91, 028	8. 22
MISSOURI									
Adair	----------	46, 236	578	46, 814	$4. 71	67	166	11, 093	4. 22
Barton	117, 992	15, 912	166	134, 070	4. 83	56	251	14, 068	9. 53
Bates	----------	1, 042	----------	1, 042	6. 00	3	86	259	4. 02
Callaway	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clark	----------	11, 658	----------	11, 658	5. 50	8	191	1, 528	7. 63
Dade	----------	16, 000	----------	16, 000	5. 19	10	278	2, 783	5. 75
Harrison	----------	2, 016	----------	2, 016	4. 31	8	195	1, 563	1. 29
Henry	722, 194	21, 729	712, 160	1, 456, 083	4. 03	159	263	41, 866	34. 78
Lafayette	----------	8, 792	61	8, 853	7. 15	34	200	6, 810	1. 30
Linn	----------	1, 275	----------	1, 275	4. 31	2	180	360	3. 54
Putnam	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Ralls	----------	3, 365	----------	3, 365	6. 12	7	159	1, 111	3. 03
Randolph	560, 123	47, 418	----------	607, 541	4. 59	1, 307	107	140, 138	4. 34
St. Clair	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Vernon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	337, 347	263, 723	423	601, 493	4. 45	178	247	44, 049	13. 66
Total Missouri	1, 737, 656	439, 166	713, 388	2, 890, 210	4. 31	1, 839	144	265, 628	10. 88
MONTANA									
Bituminous coal:									
Blaine	----------	3, 900	67	3, 967	$8. 01	5	250	1, 251	3. 17
Carbon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Cascade	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Musselshell	56, 120	34, 673	1, 956	92, 749	6. 78	89	158	14, 032	6. 61
Rosebud	----------	3, 341	----------	3, 341	5. 25	4	221	884	3. 78
Other counties	2, 731	9, 970	----------	12, 701	7. 62	15	177	2, 653	4. 79
Total bituminous coal	58, 851	51, 884	2, 023	112, 758	6. 87	113	167	18, 820	5. 99
Lignite:									
Custer	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Dawson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Richland	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sheridan	----------	6, 041	45	6, 086	3. 74	6	159	952	6. 39
Other counties	186, 786	7, 793	----------	194, 579	2. 01	26	166	4, 311	45. 14
Total lignite	186, 786	13, 834	45	200, 665	2. 06	32	164	5, 263	38. 13
Total Montana	245, 637	65, 718	2, 068	313, 423	3. 79	145	166	24, 083	13. 01

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
NEW MEXICO									
Colfax	203,272	8,625	217	212,114	$6.10	134	188	25,132	8.44
McKinley	40,000	29,539	45	69,584	5.44	54	192	10,348	6.72
Rio Arriba	4,502	2,896		7,398	5.58	12	161	1,932	3.83
Sandoval		1,457		1,457	6.50	5	146	729	2.00
San Juan		4,209		4,209	5.75	18	133	2,391	1.76
Total New Mexico	247,774	46,726	262	294,762	5.93	223	182	40,532	7.27
NORTH DAKOTA (LIGNITE)									
Adams		11,645	142	11,787	$3.80	8	174	1,393	8.46
Bowman	147,279			147,279	1.74	15	189	2,842	51.82
Burke	312,934	26,631	67,035	406,600	2.27	52	240	12,488	32.56
Burleigh		14,132		14,132	3.33	3	206	618	22.87
Divide	196,764	30,956		227,720	2.57	53	184	9,740	23.38
Dunn		5,693	100	5,793	3.00	3	260	780	7.43
Grant		21,181		21,181	3.03	5	154	770	27.51
Hettinger		5,000		5,000	3.30	13	48	627	7.97
McLean	22,616	53,283	200	76,099	3.33	24	151	3,627	20.98
Mercer	924,143	93,944	952	1,019,039	2.18	95	219	20,792	49.01
Morton		21,844		21,844	2.59	12	146	1,756	12.44
Oliver		8,748		8,748	2.25	5	170	849	10.30
Stark		75,224		75,224	1.95	7	169	1,186	63.43
Ward	258,060	97,280	126,766	482,106	2.33	45	235	10,577	45.58
Williams		2,403		2,403	4.71	3	110	329	7.30
Total North Dakota	1,861,796	467,964	195,195	2,524,955	2.29	343	199	68,374	36.93
OHIO									
Athens	94,019	187,605	1,664	283,288	$4.56	199	178	35,450	7.99
Belmont	5,813,510	190,731	39,258	6,043,499	4.21	1,889	195	367,961	16.42
Carroll	87,853	395,875	9,347	493,075	3.58	176	231	40,687	12.12
Columbiana	81,576	1,354,650		1,436,226	3.94	345	243	83,993	17.10
Coshocton	252,233	1,549,626		1,801,859	4.13	343	249	85,254	21.14
Gallia	723,026	144,735	555	868,316	3.31	271	193	52,277	16.61
Guernsey	181,383	59,917	1,107	242,407	3.43	117	207	24,272	9.99
Harrison	5,444,013	613,879	1,340,696	7,398,588	4.24	1,812	218	394,311	18.76
Hocking		62,847		62,847	5.09	51	137	6,977	9.01
Holmes	14,128	69,286		83,414	3.21	33	164	5,414	15.41
Jackson	30,088	283,866		313,954	3.95	124	228	28,213	11.13
Jefferson	1,948,183	1,464,503	3,423	3,416,109	3.70	835	217	181,551	18.82
Lawrence	90,153	350,757	8,500	449,410	3.12	83	229	19,027	23.62
Mahoning		868,587	38,211	906,798	3.85	226	237	53,498	16.95
Meigs	153,300	43,344		196,644	3.12	133	112	14,900	13.20
Morgan		12,569	2,231,827	2,244,396	3.28	253	249	63,108	35.56
Muskingum	10,243	580,481	220	590,944	2.89	179	218	39,035	15.14
Noble	978,167	391,876	405,118	1,775,161	2.56	174	260	45,257	39.22
Perry	1,107,850	473,297	950	1,582,097	4.43	348	189	65,653	24.10
Portage		77,113	7,218	84,331	3.77	22	275	6,058	13.92
Stark		694,518		694,518	3.34	156	247	38,601	17.99
Tuscarawas	325,211	2,093,332	19,499	2,438,042	3.67	783	218	170,622	14.29
Vinton	43,597	191,786		235,383	4.36	144	200	28,855	8.16
Washington		262,404		262,404	3.01	59	220	12,965	20.24
Wayne		53,062		53,062	3.47	36	264	9,509	5.58
Total Ohio	17,378,533	12,470,646	4,107,593	33,956,772	3.85	8,791	213	1,873,448	18.13

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
OKLAHOMA									
Craig	52,140	24,734	----------	76,874	$4.17	17	222	3,832	20.06
Haskell	327,719	1,287	----------	329,006	7.55	119	166	19,747	16.66
Le Flore	107,597	2,645	92	110,334	9.13	159	167	26,571	4.15
McIntosh	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Nowata	----------	41,995	----------	41,995	6.63	17	286	4,861	8.64
Okmulgee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pittsburg	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rogers	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sequoyah	187,816	----------	----------	187,816	7.74	31	254	7,881	23.83
Other counties	575,387	19,837	284	595,508	5.99	419	200	83,944	7.09
Total Oklahoma	1,250,659	90,498	376	1,341,533	6.79	762	193	146,836	9.14
PENNSYLVANIA									
Allegheny	3,564,227	1,213,481	421,981	5,199,689	$5.93	2,656	182	482,255	10.78
Armstrong	2,104,737	626,779	12,604	2,744,120	4.00	1,082	191	206,870	13.26
Beaver	----------	369,410	----------	369,410	3.23	111	173	19,222	19.22
Bedford	----------	193,227	----------	193,227	4.06	165	178	29,438	6.56
Blair	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Bradford	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Butler	1,057,956	1,005,193	1,109	2,064,258	3.58	554	209	115,722	17.84
Cambria	5,640,810	449,863	558,706	6,649,379	6.07	4,992	174	870,951	7.63
Cameron	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Centre	331,969	410,538	----------	742.507	3.64	276	251	69,391	10.70
Clarion	1,775,934	958.874	2,277	2,737.085	3.63	686	253	173,872	15.74
Clearfield	5,252,346	988,666	2,462	6,243,474	3.93	2,342	216	506,426	12.33
Clinton	463,184	16,556	----------	479,740	3.91	124	251	31,110	15.42
Elk	106,976	169,760	66	276,802	4.41	189	171	32,264	8.58
Fayette	1,746,660	405,142	68,490	2,220,292	6.18	2.091	193	403,267	5.51
Greene	9,906,510	29,092	17,436	9,953,038	6.36	5,056	175	884,659	11.25
Huntingdon	----------	58,645	----------	58,645	4.24	52	170	8,836	6.64
Indiana	4,408,394	272,578	398,438	5,079,410	5.13	2,505	189	473,893	10.72
Jefferson	1,055,340	118.263	315	1,173,918	3.58	556	189	104,931	11.19
Lawrence	----------	931,139	460	931,599	3.00	198	231	45.693	20.39
Lycoming	3,670	56,333	----------	60,003	3.41	35	185	6,477	9.26
McKean	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Mercer	378,595	331.647	162	710,404	3.70	206	220	45,267	15.69
Somerset	1,532,445	525,437	19,379	2,077,261	4.06	1,310	163	213,386	9.73
Tioga	----------	301,238	85	301,323	4.68	106	223	23,638	12.75
Venango	309,048	279,139	2	588,189	3.70	114	184	21,029	27.97
Washington	9,185,406	1,604,590	87,578	10,877,574	6.37	5,385	189	1,020,273	10.66
Westmoreland	2.494,686	713,138	265,920	3,473,744	5.41	1,775	178	316,008	10.99
Other counties	83,010	132,919	4,245	220,174	3.52	85	244	20,776	10.60
Total Pennsylvania	51,401,903	12,161,647	1,861,715	65,425,265	5.29	32,651	188	6,125,654	10.68
SOUTH DAKOTA (LIGNITE)									
Dewey	----------	20.198	250	20.448	$4.08	9	225	2,025	10.10

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
TENNESSEE									
Anderson	731,145	880,982	1,117	1,613,244	$3.72	596	195	116,181	13.89
Bledsoe	15,594	7,674	----------	23,268	3.24	51	89	4,562	5.10
Campbell	466,145	176,908	128	643,181	3.41	620	146	90,293	7.12
Claiborne	239,557	6,526	----------	246,083	3.61	177	140	24,741	9.95
Cumberland	35,638	48,762	----------	84,400	3.87	47	108	5,073	16.64
Fentress	80,693	23,691	----------	104,384	2.87	255	114	29,072	3.59
Grundy	126,977	40,682	200	167,859	4.31	54	178	9,598	17.49
Hamilton	1,352	35,710	----------	37,062	3.15	79	147	11,582	3.20
Marion	541,940	273,678	1,150	816,768	3.23	815	108	87,842	9.30
Morgan	91,941	387,823	----------	479,764	3.69	584	203	118,340	4.05
Overton	73,112	45,166	----------	118,278	2.02	249	77	19,283	6.13
Putnam	347,406	43,860	720	391,986	4.40	114	239	27,202	14.41
Rhea	----------	80,278	----------	80,278	2.35	58	231	13,380	6.00
Scott	522,725	31,351	----------	554,076	3.65	328	181	59,256	9.35
Sequatchie	400,556	104,972	----------	505,528	3.46	338	170	57,490	8.79
Van Buren	40,835	21,656	----------	62,491	3.08	32	205	6,552	9.54
White	----------	1,800	----------	1,800	2.25	6	66	393	4.58
Total Tennessee	3,715,616	2,211,519	3,315	5,930,450	3.57	4,403	155	680,840	8.71
UTAH									
Carbon	3,531,270	152,274	14,150	3,697,694	$6.50	1,848	186	343,652	10.76
Emery	959,150	171,764	5,872	1,136,786	5.96	527	207	108,992	10.43
Garfield	----------	1,035	----------	1,035	5.50	2	156	312	3.32
Iron	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Kane	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sevier	----------	49,310	----------	49,310	5.91	10	224	2,240	22.01
Summit	----------	20,082	----------	20,082	4.42	10	248	2,479	8.10
Other counties	----------	49,786	----------	49,786	5.04	21	244	5,127	9.71
Total Utah	4,490,420	444,251	20,022	4,954,693	6.35	2,418	191	462,802	10.71
VIRGINIA									
Buchanan	8,487,503	2,070,885	9,645	10,568,033	$4.18	6,761	200	1,349,469	7.83
Dickenson	7,101,645	18,548	24	7,120,217	4.17	1,793	217	388,405	18.33
Lee	337,350	278,488	165	616,003	3.67	440	177	78,077	7.89
Montgomery	----------	8,474	----------	8,474	3.90	11	178	1,953	4.34
Russell	1,951,976	332,476	----------	2,284,452	4.86	924	229	211,184	10.82
Scott	----------	16,199	----------	16,199	4.31	14	193	2,700	6.00
Tazewell	1,597,172	150,959	2,861	1,750,992	6.10	1,155	211	243,881	7.18
Wise	4,846,081	462,271	165,173	5,473,525	4.51	2,474	214	529,370	10.34
Total Virginia	24,321,727	3,338,300	177,868	27,837,895	4.41	13,572	207	2,805,039	9.92
WASHINGTON									
King	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Kittitas	133,740	9,965	4,285	147,990	$6.86	128	177	22,712	6.52
Lewis	----------	3,679	27	3,706	9.60	5	129	645	5.75
Thurston	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	21,292	55,157	----------	76,449	8.76	65	184	11,954	6.40
Total Washington	155,032	68,801	4,312	228,145	7.54	198	178	35,311	6.46

See footnotes at end of table.

TABLE 57.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1960, by States and counties—Continued

County	Production (net tons): Shipped by rail or water [1]	Production (net tons): Shipped by truck	Production (net tons): Used at mine [2]	Production (net tons): Total	Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
WEST VIRGINIA									
Barbour	3, 218, 378	61, 456	111	3, 279, 945	$4. 29	1, 198	186	222, 949	14. 71
Boone	6, 115, 074	32, 709	4, 159	6, 151, 942	4. 63	2, 313	194	448, 563	13. 71
Braxton	194, 949	40, 189	----------	235, 138	4. 24	132	108	14, 271	16. 48
Brooke	164, 429	117, 243	258, 836	540, 508	4. 81	255	191	48, 709	11. 10
Clay	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fayette	4, 503, 951	131, 813	6, 263	4, 642, 027	4. 88	2, 969	180	533, 205	8. 71
Gilmer	956, 383	----------	220	956, 603	4. 22	323	206	66, 557	14. 37
Grant	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Greenbrier	749, 373	101, 934	204	851, 511	4. 21	990	96	94, 764	8. 99
Hancock	----------	1, 200	----------	1, 200	4. 59	8	100	800	1. 50
Harrison	6, 149, 499	145, 995	751	6, 296, 245	4. 40	2, 103	197	413, 789	15. 22
Kanawha	9, 029, 578	330, 796	17, 789	9, 378, 163	4. 54	3, 417	203	693, 078	13. 53
Lewis	595, 267	----------	9, 210	604, 477	3. 35	158	209	32, 987	18. 32
Lincoln	24, 626	----------	----------	24, 626	4. 68	19	171	3, 257	7. 56
Logan	16, 292, 565	43, 093	42, 713	16, 378, 371	4. 54	6, 101	217	1, 322, 102	12. 39
Marion	8, 983, 654	28, 788	7, 914	9, 020, 356	5. 43	2, 849	211	600, 626	15. 02
Marshall	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Mason	234, 037	205, 975	52	440, 064	3. 50	194	196	38, 017	11. 58
McDowell	12, 582, 584	393, 768	341, 946	13, 318, 298	6. 60	7, 422	184	1, 366, 545	9. 75
Mercer	614, 680	24, 889	2, 690	642, 259	6. 15	427	152	64, 789	9. 91
Mineral	12, 728	68, 549	----------	81, 277	3. 61	37	227	8, 410	9. 66
Mingo	5, 652, 795	140, 467	9, 611	5, 802, 873	5. 08	2, 379	182	432, 747	13. 41
Monongalia	6, 693, 503	207, 046	229	6, 900, 778	5. 00	1, 872	209	391, 304	17. 64
Nicholas	4, 580, 739	345, 838	2, 834	4, 929, 411	5. 00	2, 586	178	461, 367	10. 68
Ohio	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pocahontas	356, 830	18, 730	----------	375, 560	4. 24	292	137	39, 997	9. 39
Preston	1, 812, 680	908, 056	8, 733	2, 729, 469	3. 50	1, 450	198	286, 885	9. 51
Putnam	----------	65, 600	----------	65, 600	4. 56	54	196	10, 581	6. 20
Raleigh	6, 370, 832	238, 109	22, 157	6, 631, 098	5. 54	3, 601	194	698, 422	9. 49
Randolph	1, 048, 705	155, 490	8, 854	1, 213, 049	5. 03	693	192	133, 262	9. 10
Taylor	51, 342	83, 969	3, 101	138, 412	3. 76	126	140	17, 644	7. 84
Tucker	142, 499	116, 700	----------	259, 199	3. 54	135	137	18, 509	14. 00
Upshur	1, 002, 635	90, 804	22	1, 093, 461	4. 29	485	178	86, 094	12. 70
Wayne	9, 749	39, 234	----------	48, 983	4. 68	82	182	14, 934	3. 28
Webster	465, 269	52, 051	960	518, 280	5. 42	345	161	55, 645	9. 31
Wyoming	10, 129, 082	530, 658	24, 132	10, 683, 872	5. 38	4, 633	196	910, 244	11. 74
Other counties	2, 749, 446	185, 396	1, 776, 380	4, 711, 222	4. 62	1, 414	229	323, 715	14. 55
Total West Virginia	111,487,861	4, 906, 545	2, 549, 871	118,944,277	5. 02	51, 062	193	9, 854, 768	12. 07
WYOMING									
Campbell	388, 672	25, 225	44, 747	458, 644	$1. 25	28	300	8, 402	54. 59
Carbon	146, 275	4, 198	1, 203	151, 676	3. 68	102	147	14, 997	10. 11
Converse	----------	525, 978	20	525, 998	3. 58	17	278	4, 733	111. 13
Fremont	----------	1, 329	----------	1, 329	6. 17	5	43	213	6. 24
Hot Springs	3, 770	8, 050	----------	11, 820	9. 47	14	149	2, 085	5. 67
Lincoln	249, 083	89	433	249, 605	3. 24	116	116	13, 425	18. 59
Sheridan	368, 057	14, 320	----------	382, 377	3. 36	46	232	10, 657	35. 88
Sweetwater	192, 872	3, 357	46, 518	242, 747	7. 27	269	112	30, 080	8. 07
Total Wyoming	1, 348, 729	582, 546	92, 921	2, 024, 196	3. 45	597	142	84, 592	23. 93
UNITED STATES									
Total United States	350,649,243	52, 699, 165	12, 163, 939	415,512,347	$4. 69	169, 400	191	32, 384, 964	12. 83

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, all other uses at mine, taken by locomotive tender, and transported from mine to point of use by conveyor, tram, or pipeline.

[3] Value received or charged for coal f.o.b. mines. Includes a value for coal not sold but used by producers, such as mine fuel and coal coked, as estimated by producers at average prices that might have been received if such coal had been sold commercially.

[4] In certain counties the average tons per man per day is large owing to auger mining, strip mining, or mechanical loading underground.

[5] Included in "Other counties" to avoid disclosing individual operations.

TRANSPORTATION

Within recent years, methods of shipping bituminous coal and lignite from the mines have changed radically; shipments by rail have declined, and shipments by water and truck have increased. Usually, shipments by water or truck (particularly for short distances) cost less than rail freight rates. See figure 13.

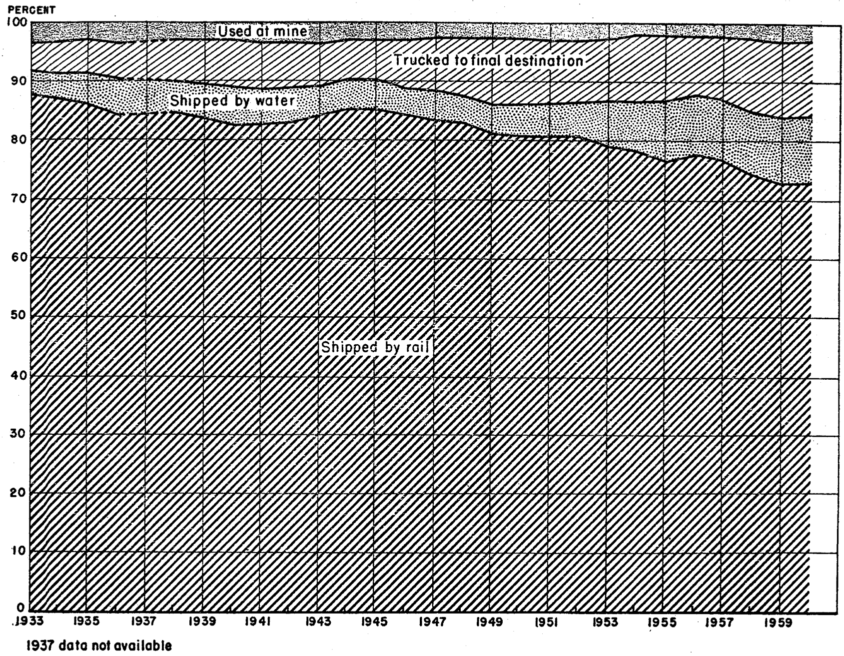

FIGURE 13.—Percentage of total production of bituminous coal and lignite, 1933–60, by method of shipment from mines, and percentage used at mines.

TABLE 58.—Bituminous coal and lignite shipped from mines, by method of shipment, and that used at mines in the United States

Year	Method of shipment from mines			Used at mine [1]	Total production
	Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination		
	THOUSAND NET TONS				
1933	293,258	13,021	15,463	11,888	333,630
1934	313,304	15,128	18,739	12,197	359,368
1935	319,742	18,327	21,960	12,344	372,373
1936	370,763	24,868	27,929	15,528	439,088
1937	295,336	16,903	25,592	10,714	348,545
1938	(2)	(2)	(2)	(2)	445,531
1939	331,190	22,229	29,534	11,902	394,855
1940	380,388	29,493	35,540	15,350	460,771
1941	425,184	30,240	40,056	18,669	514,149
1942	482,814	34,018	45,154	20,707	582,693
1943	495,863	30,188	42,433	21,693	590,177
1944	527,136	31,518	40,123	20,799	619,576
1945	490,472	27,548	41,477	18,120	577,617
1946	450,615	24,642	42,731	15,934	533,922
1947	527,282	29,803	55,859	17,680	630,624
1948	498,194	26,735	58,260	16,329	599,518
1949	356,602	21,829	47,786	11,651	437,868
1950	417,225	27,583	58,286	13,217	516,311
1951	430,387	29,984	58,132	15,162	533,665
1952	375,911	27,746	50,231	12,953	466,841
1953	362,133	35,648	47,102	12,407	457,290
1954	305,918	32,912	44,689	8,187	391,706
1955	355,924	47,476	51,607	9,626	464,633
1956	390,015	50,732	49,768	10,359	500,[illegible]74
1957	380,471	51,171	50,334	10,728	492,704
1958	305,642	43,899	50,605	10,300	410,446
1959	300,763	45,954	52,564	12,747	412,028
1960	303,865	46,784	52,699	12,164	415,512
	PERCENTAGE OF TOTAL				
1933	87.9	3.9	4.6	3.6	100.0
1934	87.2	4.2	5.2	3.4	100.0
1935	85.9	4.9	5.9	3.3	100.0
1936	84.4	5.7	6.4	3.5	100.0
1937	(2)	(2)	(2)	(2)	100.0
1938	84.7	4.9	7.3	3.1	100.0
1939	83.9	5.6	7.5	3.0	100.0
1940	82.6	6.4	7.7	3.3	100.0
1941	82.7	5.9	7.8	3.6	100.0
1942	82.9	5.8	7.7	3.6	100.0
1943	84.0	5.1	7.2	3.7	100.0
1944	85.1	5.1	6.5	3.3	100.0
1945	84.9	4.8	7.2	3.1	100.0
1946	84.4	4.6	8.0	3.0	100.0
1947	83.6	4.7	8.9	2.8	100.0
1948	83.1	4.5	9.7	2.7	100.0
1949	81.4	5.0	10.9	2.7	100.0
1950	80.8	5.3	11.3	2.6	100.0
1951	80.7	5.6	10.9	2.8	100.0
1952	80.5	5.9	10.8	2.8	100.0
1953	79.2	7.8	10.3	2.7	100.0
1954	78.1	8.4	11.4	2.1	100.0
1955	76.6	10.2	11.1	2.1	100.0
1956	77.9	10.1	9.9	2.1	100.0
1957	77.2	10.4	10.2	2.2	100.0
1958	74.5	10.7	12.3	2.5	100.0
1959	73.0	11.1	12.8	3.1	100.0
1960	73.1	11.3	12.7	2.9	100.0

[1] Includes coal used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, transported from mines to point of use by conveyors or trams, made into beehive coke at mines, and all other uses at mines.
[2] Data not available.

TABLE 59.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1960, as reported by mine operators

Route	State	Net tons: By State	Net tons: Total for route
RAILROAD			
Alabama Central	Alabama	137,523	137,523
Alaska	Alaska	716,585	716,585
Atchison, Topeka & Santa Fe	Colorado	3,189	377,420
	Illinois	130,959	
	New Mexico	243,272	
Baltimore & Ohio	Illinois	298,758	31,357,803
	Maryland	20,599	
	Ohio	1,843,171	
	Pennsylvania	4,955,796	
	West Virginia	24,239,479	
Bessemer & Lake Erie	Pennsylvania	1,766,566	1,766,566
Cambria & Indiana	do	1,949,623	1,949,623
Campbell's Creek	West Virginia	276,767	276,767
Carbon County	Utah	1,062,505	1,062,505
Central of Georgia	Alabama	37,287	37,287
Chesapeake & Ohio	Kentucky	9,501,468	44,069,774
	Ohio	78,872	
	West Virginia	34,489,434	
Cheswick & Harmar	Pennsylvania	507,859	507,859
Chicago, Burlington & Quincy	Illinois	6,200,308	7,638,248
	Iowa	253,940	
	Missouri	423,501	
	Wyoming	760,499	
Chicago & Eastern Illinois	Illinois	2,489,947	3,499,705
	Indiana	1,009,758	
Chicago & Illinois Midland	Illinois	3,877,262	3,877,262
Chicago, Milwaukee, St. Paul & Pacific	Indiana	1,444,312	1,647,711
	Montana (bituminous)	56,120	
	North Dakota (lignite)	147,279	
Chicago & North Western	Illinois	895,551	895,551
Chicago, Rock Island & Pacific	do	1,202,799	1,338,390
	Iowa	128,151	
	Oklahoma	7,440	
Clinchfield	Virginia	2,879,202	2,879,202
Colorado & Southern	Colorado	5,522	5,522
Colorado & Wyoming	do	667,541	667,541
Conemaugh & Black Lick	Pennsylvania	260,054	260,054
Denver & Rio Grande Western	Colorado	1,174,212	3,878,011
	New Mexico	4,502	
	Utah	2,699,297	
Detroit, Toledo & Ironton	Ohio	17,153	17,153
Erie	do	67,399	67,399
Great Northern	North Dakota (lignite)	509,698	509,698
Gulf, Mobile & Ohio	Alabama	242,316	946,939
	Illinois	704,623	
Illinois Central	do	8,375,629	20,641,649
	Indiana	86,790	
	Kentucky	12,179,230	
Illinois Terminal	Illinois	557,909	557,909
Interstate	Virginia	3,279,370	3,279,370
Johnstown & Stony Creek	Pennsylvania	69,029	69,029
Kansas City Southern	Oklahoma	497,645	497,645
Kentucky & Tennessee	Kentucky	404,422	404,422
Lake Erie, Franklin & Clarion	Pennsylvania	467,682	467,682
Louisville & Nashville	Alabama	1,663,129	28,011,676
	Illinois	3,150	
	Kentucky	25,321,739	
	Tennessee	911,441	
	Virginia	112,217	
Mary Lee	Alabama	828,628	828,628
Midland Valley	Arkansas	28,144	136,455
	Oklahoma	108,311	
Minneapolis & St. Louis	Illinois	805,802	866,048
	Iowa	60,246	

TABLE 59.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1960, as reported by mine operators—Con.

Route	State	Net tons: By State	Net tons: Total for route
RAILROAD—continued			
Missouri-Illinois	Illinois	712,706	712,706
Missouri-Kansas-Texas	Kansas	447,184	1,725,215
	Missouri	997,340	
	Oklahoma	280,691	
Missouri Pacific	Arkansas	307,445	4,952,587
	Illinois	4,610,941	
	Missouri	34,201	
Monon	Indiana	368,792	368,792
Monongahela	Pennsylvania	915,112	6,158,750
	West Virginia	5,243,638	
Montour	Pennsylvania	1,261,078	1,261,078
New York Central (includes coal shipped over Kanawha & Michigan, Kelley's Creek, Toledo & Ohio Central, and Zanesville & Western)	Illinois	4,512,086	20,755,144
	Indiana	5,307,825	
	Ohio	2,462,127	
	Pennsylvania	4,830,163	
	West Virginia	3,642,943	
New York, Chicago & St. Louis	Ohio	5,392,656	5,392,656
Norfolk & Western	Kentucky	3,062,731	51,462,465
	Ohio	2,600	
	Virginia	17,681,473	
	West Virginia	30,715,661	
Northern Pacific	Montana (bituminous)	189,517	1,247,400
	North Dakota (lignite)	924,143	
	Washington	133,740	
Pacific Coast	do	21,292	21,292
Peabody Short Line	Illinois	2,109,917	2,109,917
Pennsylvania	do	4,090	20,545,653
	Indiana	2,998,038	
	Ohio	3,154,205	
	Pennsylvania	14,389,320	
Pittsburgh & Lake Erie	do	740,807	740,807
Pittsburg & Shawmut	do	1,629,646	1,629,646
Pittsburgh & West Virginia	Ohio	408,580	474,143
	West Virginia	65,563	
St. Louis-San Francisco	Alabama	545,796	1,348,864
	Arkansas	66,260	
	Kansas	262,244	
	Missouri	117,992	
	Oklahoma	356,572	
Soo Line	North Dakota (lignite)	280,676	280,676
Southern	Alabama	1,649,324	4,048,544
	Indiana	194,461	
	Kentucky	671,013	
	Tennessee	1,164,281	
	Virginia	369,465	
Southern Iowa	Iowa	3,091	3,091
Tennessee	Tennessee	828,659	828,659
Tennessee Central	do	547,206	547,206
Tennessee Coal, Iron & Railroad Co.	Alabama	3,067,281	3,067,281
Toledo, Peoria & Western	Illinois	640,602	640,602
Union Pacific	Colorado	684,668	1,272,898
	Wyoming	588,230	
Unity	Pennsylvania	282,565	282,565
Utah	Utah	728,618	728,618
Wabash	Iowa	223,491	388,113
	Missouri	164,622	
Western Allegheny	Pennsylvania	175,393	175,393
Western Maryland	Maryland	281,114	3,601,548
	Pennsylvania	214,364	
	West Virginia	3,106,070	
Woodward Iron Company	Alabama	930,481	930,481
Youngstown & Southern	Ohio	14,177	14,177
Total railroad shipments		303,865,578	303,865,578

TABLE 59.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1960, as reported by mine operators—Con.

Route	State	Net tons	
		By State	Total for route
WATERWAY			
Allegheny River	Pennsylvania	1,549,018	1,549,018
Black Warrior River	Alabama	1,609,447	1,609,447
Green River	Kentucky	5,787,242	5,787,242
Guyandot River	West Virginia	24,626	24,626
Illinois River	Illinois	2,067,835	2,067,835
Inland Water Way	Alabama	257,647	257,647
Kanawha River	West Virginia	4,381,176	4,381,176
Kentucky River	Kentucky	151,739	151,739
Monongahela River	Pennsylvania	15,437,828	19,746,195
	West Virginia	4,308,367	
Ohio River	Illinois	244,920	10,874,097
	Indiana	1,888,970	
	Kentucky	3,808,477	
	Ohio	3,937,593	
	West Virginia	994,137	
Tennessee River	Tennessee	264,029	264,029
Tradewater River	Kentucky	70,614	70,614
Total waterway shipments		46,783,665	46,783,665
Total loaded at mines for shipment by railroads and waterways		350,649,243	350,649,243
Shipped by truck from mine to final destination		52,699,165	52,699,165
Used at mine [1]		12,163,939	12,163,939
Total production, 1960		415,512,347	415,512,347

[1] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, all other uses at mine, taken by locomotive tender, and transported from mine to point of use by conveyor, tram, or pipeline.

CONSUMPTION

The statistics on consumption of bituminous coal and lignite, by major consumer classes, are based upon complete coverage of all consumers in each class except "Other manufacturing and mining industries" and "Retail deliveries to other consumers." The figures for both categories are based upon a monthly sample approximating 35 percent coverage. A new benchmark representing complete coverage for "Other manufacturing and mining industries" was established for 1954, based upon data from the Census of Manufactures and the Census of Mineral Industries. The new benchmark for "Retail deliveries to other consumers" for 1954 represents the residual tonnage not otherwise accounted for and includes some coal shipped by truck from mine to final destination.

Data for each month are determined by matching plants reporting for the latest month with identical plants reporting the preceding month, calculating the percentage change from the previous month, and applying this percentage change to the published figure for the previous month. The results have been reasonably reliable over a period of years. A detailed analysis of the establishment of the new benchmarks and the revisions in "Cement mills," "Steel and rolling mills," and "Bunker, foreign and lake vessels," is given in Bureau of Mines Weekly Coal Report 2113, March 14, 1958. These revisions are applied to the figures in table 60 for 1933–60. The total of the classes approximates total consumption and is a much more reliable figure than "calculated" consumption based on production, imports, exports, and changes in stocks, because certain significant items of stocks are not included in yearend stocks. See figure 14.

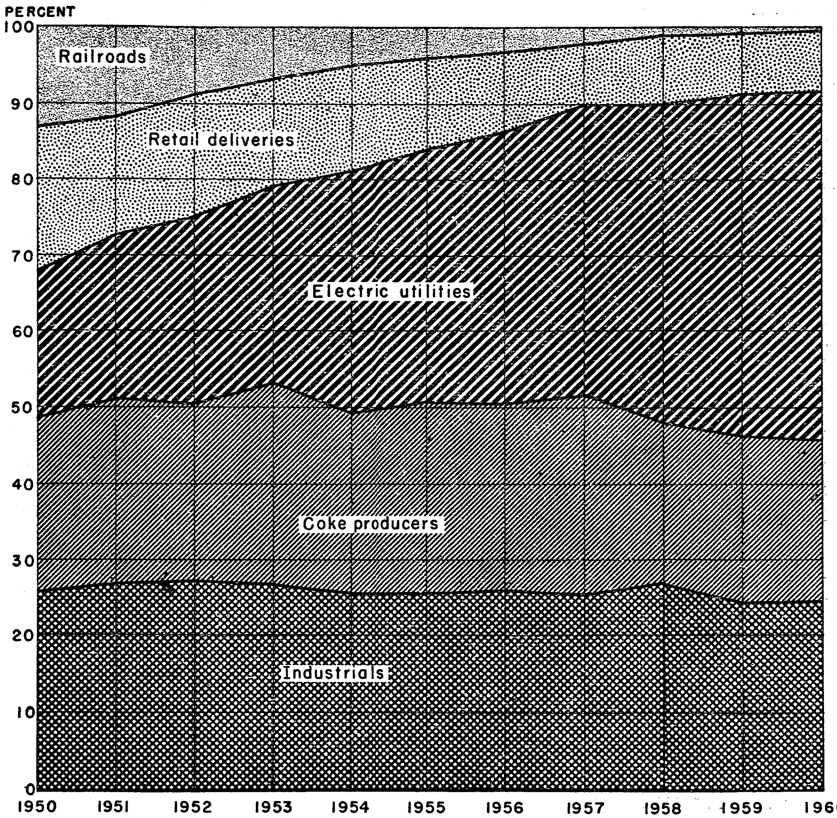

FIGURE 14.—Percentage of total consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States, 1950–60.

TABLE 60.—Consumption of bituminous coal and lignite, by consumer class, with retail deliveries in the United States, 1933–60

(Thousand net tons)

Year and month	Electric power utilities [1]	Bunker, foreign and lake vessel [2]	Railroads (class I) [3]	Manufacturing and mining industries: Beehive coke plants	Oven coke plants	Steel and rolling mills [4]	Cement mills	Other manufacturing and mining industries [5]	Retail deliveries to other consumers [6]	Total of classes shown [7]
1933	27,088	2,298	72,548	1,408	38,681	14,129	2,760	81,377	77,396	317,685
1934	29,707	2,423	76,037	1,635	44,343	15,391	3,457	87,314	83,507	343,814
1935	30,936	2,683	77,109	1,469	49,046	16,585	3,456	94,598	80,444	356,326
1936	38,104	3,052	86,391	2,698	63,244	19,019	4,711	111,030	80,044	408,293
1937	41,045	3,433	88,080	4,927	69,575	18,148	5,182	124,056	76,331	430,777
1938	36,440	2,310	73,921	1,360	45,266	11,877	4,413	94,196	66,498	336,281
1939	42,304	2,764	79,072	2,298	61,216	13,843	5,194	100,637	68,770	376,098
1940	49,126	2,989	85,130	4,803	76,583	14,169	5,559	107,864	84,687	430,910
1941	59,888	3,304	97,384	10,529	82,609	15,384	6,735	121,880	94,402	492,115
1942	63,472	3,226	115,410	12,876	87,974	14,722	7,462	132,767	102,141	540,050
1943	74,036	3,042	130,283	12,441	90,019	15,864	5,842	142,149	120,121	593,797
1944	76,656	3,069	132,049	10,858	94,438	15,152	3,767	131,498	122,112	589,599
1945	71,603	3,192	125,120	8,135	87,214	14,241	4,203	126,562	119,297	559,567
1946	68,743	2,632	110,166	7,167	76,121	12,151	6,990	117,732	98,684	500,386
1947	86,009	3,087	109,296	10,475	94,325	14,195	7,919	123,928	96,657	545,891
1948	95,620	2,552	94,838	10,322	96,984	14,193	8,546	110,060	86,794	519,909
1949	80,610	2,056	68,123	5,354	85,882	10,529	7,966	96,629	88,389	445,538
1950	88,262	2,042	60,969	9,088	94,757	10,877	7,923	95,862	84,422	454,202
1951	101,898	2,220	54,005	11,418	102.030	11,260	8,507	103,188	74,378	468,904
1952	103,309	1,839	37,962	6,912	90,702	9,632	7,903	93,637	66,861	418,757
1953	112,283	1,839	27,735	8,226	104,648	8,764	8,167	95,160	59,976	426,798
1954	115,235	1,244	17,370	980	84,411	6,983	7,924	77,115	51,798	363,060
1955	140,550	1,499	15,473	2,869	104,508	7,353	8,529	89,611	53,020	423.412
1956	154,983	1,470	12,308	4,043	101,870	7,189	9,026	93,302	48,667	432,858
1957	157,398	1,364	8,401	3,473	104,547	6,938	8,633	87,202	35,712	413,668
1958	152,928	955	3,725	1,017	75,563	7,268	8,256	81,372	35,619	366,703
1959:										
January	15,907	1	339	139	7,865	808	645	6,937	4,044	36,685
February	14,002	3	304	154	7,720	768	591	6,160	3,551	33,253
March	14,400	4	286	235	8,860	756	717	6,697	2,802	34,757
April	12,632	66	241	267	8,611	645	693	6,148	1,634	30,937
May	12,718	154	189	223	8,830	567	757	5,798	1,018	30,254
June	13,249	158	152	202	8,361	548	732	5,462	1,059	29,923
July	13,391	126	133	119	4,931	343	722	5,118	1,248	26,131
August	13,806	105	131	88	2,530	282	725	5,302	1,622	24,591
September	12,987	89	137	67	2,458	261	712	5,382	2,281	24,374
October	13,389	108	186	67	2,535	258	685	6,135	2,881	26,244
November	14,084	120	236	112	6,100	620	753	6,841	3,267	32,133
December	15,223	35	266	154	8,553	818	778	7,416	3,731	36,974
Total	165,788	969	2,600	1,827	77,354	6,674	8,510	73,396	29,138	366,256
1960:										
January	15,867	2	263	197	8,707	825	704	7,542	4,063	38,170
February	15,008	2	248	212	8,386	782	623	7,263	3,986	36,510
March	16,111	5	251	225	8,878	857	673	7,895	4,269	39,164
April	13,083	87	185	166	8,011	591	675	6,300	1,729	30,827
May	13,119	143	145	130	7,469	528	775	6,035	1,323	29,667
June	13,197	139	111	98	6,421	483	721	5,691	1,098	27,959
July	13,403	118	99	87	5,630	429	715	5,014	1,119	26,614
August	14,673	121	107	127	5,546	465	680	5,465	1,616	28,800
September	13,663	115	112	102	5,070	461	648	5,312	1,978	27,461
October	14,305	125	192	94	5,485	548	643	6,162	2,609	30,163
November	14,695	74	175	102	4,946	624	671	6,575	2,729	30,591
December	16,758	14	213	100	4,826	785	688	7,233	3,886	34,503
Total	173,882	945	2,101	1,640	79,375	7,378	8,216	76,487	30,405	380,429

[1] Federal Power Commission.
[2] Bureau of the Census, U.S. Department of Commerce. Ore and Coal Exchange.
[3] Association of American Railroads. Represents consumption of bituminous coal and lignite for all uses, including locomotive, powerhouse, shop, and station fuel.
[4] Estimates based upon reports collected from a selected list of representative steel and rolling mills.
[5] Estimates based upon reports collected from a selected list of representative manufacturing plants.
[6] Estimates based upon reports collected from a selected list of representative retailers. Includes some coal shipped by truck from mine to final destination.
[7] The total of classes shown approximates total consumption. The calculation of consumption from production, imports, exports, and changes in stocks is not as accurate as the "Total of classes shown" because certain significant items of stocks are not included in yearend stocks. These items are: Stocks on Lake and Tidewater docks, stocks at other intermediate storage piles between mine and consumer, and coal in transit.

TABLE 61.—Fuel economy in consumption of coal at electric-utility powerplants in the United States

Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100
1919	3.20	100.0	1933	1.46	45.6	1947	1.31	40.9
1920	3.00	93.8	1934	1.45	45.3	1948	1.30	40.6
1921	2.70	84.4	1935	1.44	45.0	1949	1.24	38.8
1922	2.50	78.1	1936	1.44	45.0	1950	1.19	37.2
1923	2.40	75.0	1937	1.44	45.0	1951	1.14	35.6
1924	2.20	68.8	1938	1.40	43.8	1952	1.10	34.4
1925	2.00	62.5	1939	1.38	43.1	1953	1.06	33.1
1926	1.90	59.4	1940	1.34	41.9	1954	.99	30.9
1927	1.82	56.9	1941	1.34	41.9	1955	.95	29.7
1928	1.73	54.1	1942	1.30	40.6	1956	.94	29.4
1929	1.66	51.9	1943	1.30	40.6	1957	.93	29.1
1930	1.60	50.0	1944	1.29	40.3	1958	.90	28.1
1931	1.52	47.5	1945	1.30	40.6	1959	.89	27.8
1932	1.49	46.6	1946	1.29	40.3	1960	.88	27.5

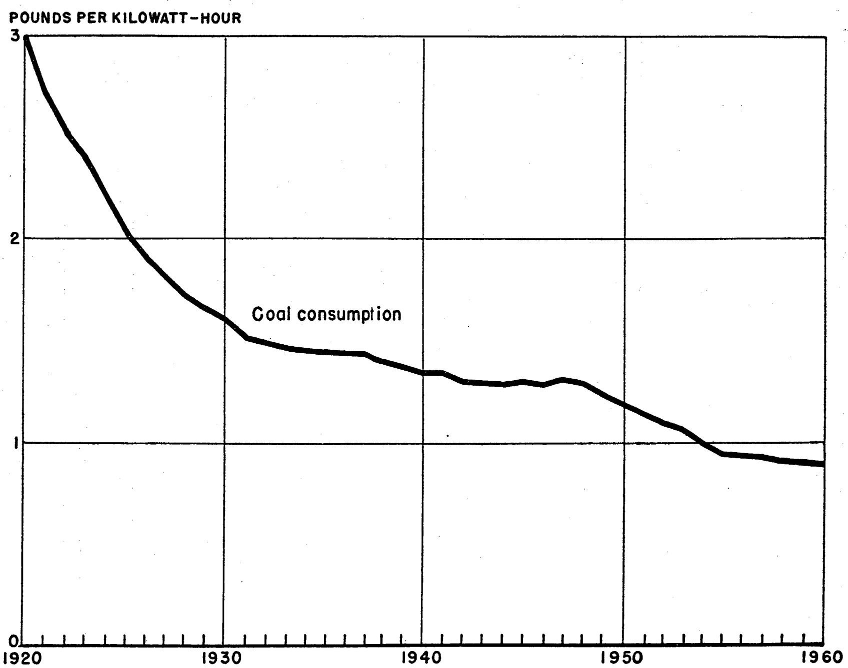

FIGURE 15.—Trend in fuel economy at electric-utility powerplants in the United States, 1920–60.

RELATIVE RATE OF GROWTH OF MINERAL FUELS AND WATERPOWER

Information on the trends in consumption of the various energy fuels and waterpower is presented in the Review of Mineral-Fuel Industries, Minerals Yearbook, volume II, 1960, and in Weekly Coal Report 2294.

STOCKS

The figures on stocks are based on complete coverage for all categories except "Other manufacturing and mining industries" and "Retail dealer stocks." Stocks for these two categories are based on samples, and the statistical procedure followed is that for calculating total consumption.

TABLE 62.—Stocks of bituminous coal and lignite in the hands of commercial consumers and in retail dealers' yards in the United States

Date	Total stocks (net tons)	Days' supply at current rate of consumption on date of stocktaking							
		Electric power utilities	Railroads (class I)	Manufacturing and mining industries				Retail dealers	Total
				Oven coke plants	Steel and rolling mills	Cement mills	Other manufacturing and mining industries		
1959									
Jan. 31	71,203,000	88	33	48	26	64	48	6	60
Feb. 28	69,167,000	86	32	43	24	57	52	5	58
Mar. 31	65,868,000	90	37	41	25	45	45	6	59
Apr. 30	65,739,000	100	34	40	28	45	46	9	64
May 31	67,659,000	106	44	42	34	45	51	19	69
June 30	70,369,000	102	53	45	40	49	55	23	71
July 31	65,374,000	101	58	58	66	50	58	23	78
Aug. 31	66,596,000	102	58	103	73	53	56	20	84
Sept. 30	68,732,000	110	54	97	74	55	55	14	85
Oct. 31	72,663,000	115	41	115	67	64	52	12	86
Nov. 30	74,653,000	108	30	50	26	57	47	10	70
Dec. 31	76,202,000	102	26	42	25	57	47	9	64
1960									
Jan. 31	73,426,000	94	27	41	25	56	45	6	60
Feb. 29	70,640,000	89	24	39	24	53	43	5	56
Mar. 31	66,955,000	83	24	39	22	45	40	3	53
Apr. 30	68,153,000	102	29	42	33	40	49	8	66
May 31	71,364,000	110	36	49	42	39	54	13	74
June 30	73,928,000	110	48	58	41	44	56	19	79
July 31	70,235,000	110	49	57	44	47	61	20	82
Aug. 31	72,662,000	104	47	60	37	53	56	15	78
Sept. 30	74,458,000	112	44	65	38	55	56	12	81
Oct. 31	76,206,000	113	26	63	35	58	51	10	78
Nov. 30	76,730,000	107	31	68	27	58	47	9	75
Dec. 31	73,244,000	93	28	71	23	54	41	5	66

PRICES

TABLE 63.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, by States

State	1959				1960			
	Underground mines	Strip mines	Auger mines	Total, all mines	Underground mines	Strip mines	Auger mines	Total, all mines
Alabama	$6.98	$5.03	$8.74	$6.55	$7.61	$5.06	$6.87	$7.10
Alaska	8.58	8.96		8.89	7.24	8.90		8.75
Arizona	8.64			8.64	10.50			10.50
Arkansas	8.55	7.43		7.89	8.43	7.30		7.61
Colorado	7.00	3.34		6.39	6.35	3.73		5.85
Georgia	5.00			5.00	5.00			5.00
Illinois	4.10	4.01	3.82	4.06	4.00	4.01		4.00
Indiana	4.34	3.92		4.05	4.29	3.82		3.96
Iowa	4.21	3.42		3.57	4.44	3.41		3.60
Kansas	6.52	4.66		4.67	7.58	4.71		4.73
Kentucky	4.78	3.33	3.55	4.30	4.69	3.34	3.07	4.22
Maryland	4.67	3.30		3.78	4.54	3.32		3.74
Missouri	4.94	4.32		4.34	5.04	4.28		4.31
Montana:								
Bituminous	7.11	6.34		7.06	6.90	6.58		6.87
Lignite	4.36	1.92		2.08	4.28	1.93		2.06
Total Montana	6.87	2.13		4.28	6.64	2.12		3.79
New Mexico	6.04	4.17		5.64	6.17	4.59		5.93
North Dakota (lignite)	4.72	2.25		2.25	4.71	2.29		2.29
Ohio	4.56	3.61	3.43	3.86	4.49	3.64	3.10	3.85
Oklahoma	8.93	6.09		6.74	9.02	6.29		6.79
Pennsylvania	6.01	3.73	3.19	5.28	6.07	3.68	3.23	5.29
South Dakota (lignite)		4.01		4.01		4.08		4.08
Tennessee	3.99	4.07	3.66	3.99	3.68	3.36	3.30	3.57
Utah	6.16			6.16	6.35			6.35
Virginia	4.76	3.65	3.97	4.68	4.50	3.17	3.23	4.41
Washington	7.46	9.32		7.60	7.38	9.75		7.54
West Virginia	5.31	3.74	4.11	5.19	5.14	3.66	3.67	5.02
Wyoming	6.91	2.66		3.37	7.04	2.80		3.45
Total	5.23	3.76	3.83	4.77	5.14	3.74	3.37	4.69

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TABLE 64.—Production and average value per ton, f.o.b. mines, of bituminous coal and lignite sold in open market and not sold in open market, 1960, by States

State	Production					Average value per ton, f.o.b. mines		
	Sold in open market		Not sold in open market		Total (net tons)	Sold in open market	Not sold in open market	Total
	Net tons	Percentage of total	Net tons	Percentage of total				
Alabama	5,599,957	43.0	7,410,690	57.0	13,010,647	$6.09	$7.87	$7.10
Alaska	721,682	99.9	789	.1	722,471	8.74	10.62	8.75
Arizona	1,531	27.7	3,995	72.3	5,526	10.50	10.50	10.50
Arkansas	409,199	100.0			409,199	7.61		7.61
Colorado	2,936,761	81.4	670,525	18.6	3,607,286	5.04	9.39	5.85
Georgia	4,215	100.0			4,215	5.00		5.00
Illinois	45,977,486	100.0			45,977,486	4.00		4.00
Indiana	15,531,832	99.9	6,037	.1	15,537,869	3.96	4.62	3.96
Iowa	1,068,024	100.0			1,068,024	3.60		3.60
Kansas	887,174	99.9	1,100	.1	888,274	4.73	4.66	4.73
Kentucky	59,322,376	88.7	7,524,116	11.3	66,846,492	3.99	6.07	4.22
Maryland	747,834	100.0			747,834	3.74		3.74
Missouri	2,889,571	100.0	639		2,890,210	4.31	4.67	4.31
Montana:								
Bituminous	112,758	100.0			112,758	6.87		6.87
Lignite	200,665	100.0			200,665	2.06		2.06
Total Montana	313,423	100.0			313,423	3.79		3.79
New Mexico	57,838	19.6	236,924	80.4	294,762	6.72	5.73	5.93
North Dakota (lignite)	2,463,975	97.6	60,980	2.4	2,524,955	2.31	1.70	2.29
Ohio	29,988,513	88.3	3,968,259	11.7	33,956,772	3.97	3.00	3.85
Oklahoma	1,131,481	84.3	210,052	15.7	1,341,533	6.34	9.25	6.79
Pennsylvania	39,539,053	60.4	25,886,212	39.6	65,425,265	4.45	6.57	5.29
South Dakota (lignite)	20,448	100.0			20,448	4.08		4.08
Tennessee	5,813,744	98.0	116,706	2.0	5,930,450	3.57	3.50	3.57
Utah	2,549,964	51.5	2,404,729	48.5	4,954,693	5.04	7.74	6.35
Virginia	27,602,522	99.2	235,373	.8	27,837,895	4.40	5.63	4.41
Washington	223,885	98.1	4,260	1.9	228,145	7.51	9.49	7.54
West Virginia	103,280,049	86.8	15,664,228	13.2	118,944,277	4.84	6.20	5.02
Wyoming	839,775	41.5	1,184,421	58.5	2,024,196	3.59	3.36	3.45
Total	349,922,312	84.2	65,590,035	15.8	415,512,347	4.38	6.36	4.69

LIGNITE

TABLE 65.—Summary of operations at lignite mines in the United States, 1960, States [1]

Item	Montana	North Dakota	South Dakota	Total
UNDERGROUND MINES				
Number of mines	3	1	------------	4
Shot from solid ... net tons	9,233	2,403	------------	11,636
Cut by machines ... do	2,033	------------	------------	2,033
Total production ... do	11,266	2,403	------------	13,669
Number of cutting machines	2	------------	------------	2
Average output per machine ... net tons	1,017	------------	------------	1,017
Underground production cut by machine ... percent	18.0	------------	------------	14.9
Average value per ton	$4.28	$4.71	------------	$4.35
Average number of men working daily	14	3	------------	17
Average number of days worked	118	110	------------	117
Number of man-days worked	1,656	329	------------	1,985
Average tons per man per day	6.80	7.30	------------	6.89
STRIP MINES				
Number of mines	3	31	1	35
Production ... net tons	189,399	2,522,552	20,448	2,732,399
Average value per ton	$1.93	$2.29	$4.08	$2.28
Number of shovels and draglines	4	55	2	61
Average number of men working daily	18	340	9	367
Average number of days worked	200	200	225	201
Number of man-days worked	3,607	68,045	2,025	73,677
Average tons per man per day	52.51	37.07	10.10	37.09
TOTAL, ALL LIGNITE MINES				
Number of mines	6	32	1	39
Production (net tons):				
Shipped by rail [2]	186,786	1,861,796	------------	2,048,582
Shipped by truck	13,834	467,964	20,198	501,996
Used at mines [3]	45	195,195	250	195,490
Total	200,665	2,524,955	20,448	2,746,068
Average value per ton	$2.06	$2.29	$4.08	$2.29
Average number of men working daily	32	343	9	384
Average number of days worked	164	199	225	197
Number of man-days worked	5,263	68,374	2,025	75,662
Average tons per man per day	38.13	36.93	10.10	36.29

[1] Exclusive of Texas (lignite).
[2] Includes coal loaded at mines directly into railroad cars and hauled by trucks to railroad sidings.
[3] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, all other uses at mine, taken by locomotive tender, and transported from mine to point of use by conveyor or tram.

FOREIGN TRADE[7]

Imports of bituminous coal and lignite are very small. Exports have been an important item of foreign trade for many years, particularly since the close of World War II. See figure 16.

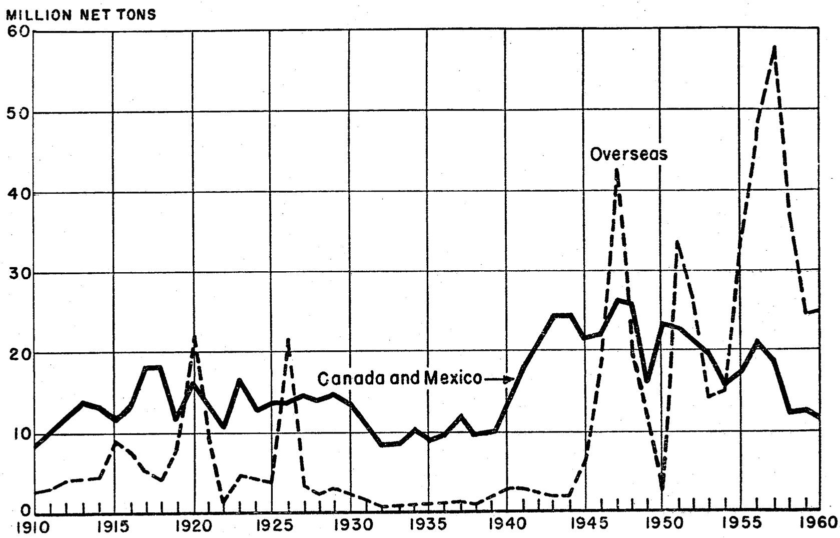

FIGURE 16.—Exports of bituminous coal and lignite from the United States to Canada and Mexico and overseas, 1910–60.

TABLE 66.—Bituminous coal[1] imported for consumption in the United States by countries and customs districts

(Net tons)

Country and customs district	1958	1959	1960
Country:			
North America: Canada	306,940	374,713	260,372
Europe: Germany, West	(2)		
Asia: Japan			123
Total	306,940	374,713	260,495
Customs district:			
Alaska	140	30	20
Chicago	(2)		
Dakota	45		11
Duluth and Superior	67		
Galveston			51
Los Angeles			123
Maine and New Hampshire	190,290	114,095	115,779
Michigan		64	57
Montana and Idaho	98,359	71,767	49,494
Pittsburgh			37
Vermont	146	306	
Washington	17,893	188,451	94,923
Total	306,940	374,713	260,495

[1] Includes slack, culm, and lignite.
[2] Less than 1 ton.

Source: Bureau of the Census.

[7] Figures on imports and exports compiled by M. B. Price and E. D. Page, of the Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.

TABLE 67.—Exports of bituminous coal, by country groups

(Thousand net tons)

Year	Canada (including Newfoundland) and Mexico	Overseas (all other countries)								Grand total
		West Indies and Central America[1]	Miquelon, Bermuda, and Greenland	South America	Europe	Asia	Africa	Oceania	Total overseas	
1951–55 (average)	19,326	76	6	1,975	19,212	3,126	360	8	24,763	44,089
1956	20,705	40	2	2,828	41,156	3,509	313		47,848	68,553
1957	18,493	35	4	2,269	49,701	5,673	271		57,953	76,446
1958	12,272	34	1	1,452	32,889	3,550	95		38,021	50,293
1959	[2] 12,459	17	(3)	1,499	[2] 19,128	4,077	73		[2] 24,794	[2] 37,253
1960	11,682	18	2	2,178	16,900	5,654	57		24,809	36,491

[1] Includes Panama.
[2] Revised figure.
[3] Less than 1,000 tons.

Source: Bureau of the Census.

TABLE 68.—Bituminous coal exported from the United States, by countries

(Net tons)

Country	1957	1958	1959	1960
North America:				
Bermuda	1,134	1,211		
Canada	18,444,949	12,238,179	[2] 12,406,800	11,625,322
Central America:				
Costa Rica		120	20	20
El Salvador	120	45	45	45
Guatemala	360	160	120	136
Honduras	140	65	170	135
Other Central America	25	25	25	52
Greenland	2,264			
Mexico	47,913	33,997	51,512	57,332
Miquelon			643	2,328
West Indies:				
British:				
Barbados		537		
Jamaica	51	888		
Trinidad and Tobago	2,237	653	2,549	2,129
Cuba	30,905	29,404	12,758	14,482
Dominican Republic	230	218	226	59
French	1,259	988	521	588
Haiti			150	
Netherlands Antilles			100	
Total North America	18,531,587	12,306,490	[2] 12,475,639	11,702,628

See footnotes at end of table.

TABLE 68.—Bituminous coal exported from the United States, by countries[1]—Con.

(Net tons)

Country	1957	1958	1959	1960
South America:				
Argentina	914,006	216,186	397,786	680,546
Brazil	1,059,802	977,988	880,970	1,048,716
Chile	194,333	192,694	162,312	368,545
Peru	3,390	44		
Uruguay	95,564	65,143	58,253	79,919
Other South America	1,330	274	28	34
Total	2,268,425	1,452,329	1,499,349	2,177,760
Europe:				
Austria	926,780	1,083,078	809,985	587,626
Azores	2,390			
Belgium-Luxembourg	2,146,214	2,280,116	1,150,373	1,106,037
Denmark	355,551	495,360	189,309	130,157
Finland	242,266	102,960	5,553	
France	7,116,005	3,000,913	[2] 1,042,303	712,308
Germany, West	15,569,712	9,708,332	4,463,301	4,565,556
Gibraltar	22,305	7,158		
Greece	212,043	74,129	20,763	
Hungary	167,819			
Iceland	8,447			
Ireland		516,970	417,365	[3] 207,787
Italy	8,761,669	6,989,027	5,200,296	4,845,814
Netherlands	8,062,538	5,515,399	3,288,234	2,785,484
Norway	367,525	214,799	110,969	76,932
Poland and Danzig	85,388	52,223		
Portugal	303,744	232,653	147,512	52,453
Spain	757,629	733,492	747,165	331,439
Sweden	1,282,666	788,379	749,546	645,193
Switzerland	402,483	421,038	262,668	306,592
Trieste	648,835	263,872	88,065	38,392
United Kingdom	1,748,879	20,156	24,499	
Yugoslavia	510,234	389,222	410,619	508,427
Total	49,701,122	32,889,276	[2] 19,128,525	16,900,197
Asia:				
Indonesia	44,170	24,479	48,973	23,308
Japan	4,872,589	3,299,133	4,020,288	5,617,191
Korea, Republic of	754,645	225,877	7,318	
Turkey		6		11,814
Other Asia	1,935	584	291	1,428
Total Asia	5,673,339	3,550,079	4,076,870	5,653,741
Africa:				
Algeria	138,928			
Angola	26,125	11,506		5,596
Canary Islands	12,382	9,192	2,799	
Morocco	11,496			
Libya	32,159	32,590	44,644	44,832
Tunisia	13,806			
United Arab Republic (Egypt Region)[4]	34,810	24,470	25,605	5,731
Other Africa	1,350	17,450		939
Total Africa	271,056	95,208	73,048	57,098
Grand total	76,445,529	50,293,382	[2] 37,253,431	36,491,424

[1] Amounts stated do not include fuel or bunker coal loaded on vessels engaged in foreign trade, which aggregated 419,360 tons in 1957, 358,519 tons in 1958, 365,806 tons in 1959, and 307,812 tons in 1960.
[2] Revised figure.
[3] Adjusted by the Bureau of Mines to include 63,576 tons credited to the United Kingdom by the Bureau of the Census.
[4] Effective July 1, 1958.

Source: Bureau of the Census.

TABLE 69.—Bituminous coal exported from the United States, by customs districts

(Net tons)

Customs district	1957	1958	1959	1960
North Atlantic:				
Connecticut	61			
Maine and New Hampshire	12,165	1,893	5,933	2,120
Massachusetts	7,341	58	9,812	54
New York	3,282	656	9,835	12,255
Philadelphia	617,457	342,737	80,818	39,092
Rhode Island	3,121			
South Atlantic:				
Georgia			102	
Maryland	4,913,765	3,452,683	1,586,620	1,471,576
North Carolina	46			
Virginia	51,212,392	33,875,389	[1] 23,031,575	23,194,833
Gulf Coast:				
Florida	99		63	
Galveston	66	278	559	45
Mobile	123,399	118,156	101,671	110,031
New Orleans	11,761	6,176	315	388
Sabine				2,440
Mexican border:				
Arizona	49	114		199
El Paso	4,556	24,632	51,005	56,802
Laredo	142	160	266	239
Pacific Coast:				
Los Angeles	45,403			60
Oregon	555,524	27,232		
San Diego	66		2	92
San Francisco	143,427	191,558		
Washington	99,832	33,160	1,231	8,254
Northern border:				
Buffalo	286,697	306,146	344,102	232,078
Chicago	717,255	157,384	112,298	40,412
Dakota	30,820	45,090	17,892	15,294
Duluth and Superior	66,187	70,489	21,420	12,139
Indiana		3,723		939
Michigan	1,141,216	831,930	566,843	349,790
Minnesota		701	223	
Montana and Idaho	158	164	219	289
Ohio	11,984,090	8,652,892	[1] 9,420,259	9,299,197
Rochester	2,905,362	1,583,879	[1] 1,304,766	1,265,978
St. Lawrence	1,178,122	507,380	548,412	375,447
Vermont		43	115	55
Wisconsin		49		
Miscellaneous:				
Kentucky			54	1,326
Pittsburgh			16,661	
Total	[2] 76,445,529	[2] 50,293,382	[1 2] 37,253,431	36,491,424

[1] Revised figure.
[2] Includes 381,668 tons in 1957, 58,630 tons in 1958, and 20,360 tons in 1959, representing estimated data for which district breakdown is not available.

Source: Bureau of the Census.

TABLE 70.—Shipments of bituminous coal to possessions and other areas administered by the United States

(Net tons)

Territory	1958	1959	1960
Guam		1	2
Puerto Rico	1,209	1,051	1,499
Virgin Islands	1		2

Source: Bureau of the Census.

WORLD PRODUCTION

The United States supplied 434 million tons of bituminous coal, anthracite, and lignite, or 15 percent of the world output, in 1960.

World coal output increased slightly over 4 percent, principally in the Soviet bloc countries, in Asia, Australia, and Africa. In the western countries there was an overall decline, principally in the United Kingdom, which was offset somewhat by an increase in West Germany.

TABLE 71.—World production of bituminous coal, anthracite, and lignite, by countries [1]

(Thousand short tons)

Country	1956	1957	1958	1959	1960 [2]
North America:					
Canada:					
Bituminous	12,574	10,940	9,434	8,680	8,804
Lignite	2,342	2,249	2,253	1,948	2,170
Greenland: Bituminous	18	19	35	30	31
Mexico: Bituminous	1,552	1,566	1,621	1,748	1,958
United States:					
Anthracite (Pennsylvania)	28,900	25,338	21,171	20,649	18,817
Bituminous	497,997	490,097	408,019	409,248	412,766
Lignite	2,878	2,607	2,427	2,780	2,746
Total	546,261	532,816	444,960	445,083	447,292
South America:					
Argentina: Bituminous	169	230	288	331	300
Brazil: Bituminous (including lignite)	2,463	2,285	2,469	2,568	2,381
Chile: Bituminous (mined)	2,511	2,310	2,204	2,083	1,621
Colombia: Bituminous	2,094	2,535	2,535	2,756	2,976
Peru: Bituminous and anthracite	160	155	246	191	173
Venezuela: Bituminous	34	39	40	37	39
Total	7,431	7,554	7,782	7,966	7,490
Europe:					
Albania: Lignite	247	259	282	319	331
Austria:					
Bituminous	183	168	155	148	146
Lignite	7,419	7,581	7,158	6,857	6,584
Belgium: Bituminous and anthracite	32,475	31,968	29,831	25,085	24,764
Bulgaria:					
Anthracite	137	[3] 150	[3] 165	[3] 165	[3] 165
Lignite (including bituminous)	11,787	12,957	13,867	16,745	18,712
Czechoslovakia:					
Bituminous	25,806	26,655	28,453	29,217	30,450
Lignite	51,036	56,235	62,653	59,196	64,379
Denmark: Lignite	1,534	2,822	2,695	2,540	2,545
France:					
Bituminous and anthracite	60,773	62,610	63,626	63,500	61,685
Lignite	2,484	2,528	2,555	2,398	2,509
Germany:					
Bituminous and anthracite:					
East	3,024	3,035	3,201	3,132	3,003
West	149,427	148,068	147,183	139,329	157,911
Saar: Bituminous	18,838	18,139	18,103	17,908	
Lignite:					
East	226,928	234,346	236,962	236,776	248,681
West	104,976	106,716	103,052	102,991	105,570
Pech coal: West	1,979	2,048	2,013	2,022	1,969
Greece: Lignite	880	1,100	1,315	1,773	2,791
Hungary:					
Bituminous	2,619	2,510	2,895	3,014	3,135
Lignite	20,080	20,861	23,826	24,927	26,098
Ireland: Bituminous and anthracite	265	266	225	257	259
Italy:					
Bituminous and anthracite	1,188	1,129	798	826	812
Lignite	445	434	916	1,346	847
Netherlands:					
Bituminous and anthracite	13,047	12,540	13,095	13,203	13,777
Lignite	298	317	281	219	4

See footnotes at end of table.

TABLE 71.—World production of bituminous coal, anthracite, and lignite, by countries [1]—Continued

(Thousand short tons)

Country	1956	1957	1958	1959	1960 [2]
Europe—Continued					
Poland:					
Bituminous	104,884	103,723	104,699	109,246	115,123
Lignite	6,816	6,563	8,313	10,205	10,281
Portugal:					
Anthracite	456	550	625	581	478
Lignite	161	203	172	175	172
Rumania:					
Bituminous and anthracite	211	277	330	330	330
Lignite	6,924	7,500	7,813	8,466	8,667
Spain:					
Bituminous and anthracite	14,165	15,356	15,922	14,926	15,193
Lignite	2,125	2,777	2,945	2,317	1,942
Svalbard (Spitsbergen): Bituminous:					
Controlled by Norway	430	423	317	278	443
Controlled by U.S.S.R	386	434	425	505	[3] 510
Sweden: Bituminous	324	335	352	300	272
Switzerland: Bituminous and anthracite (including lignite) [3]	11	11	11	11	11
U.S.S.R.: [4]					
Bituminous and anthracite	335,104	362,111	389,148	402,532	411,160
Lignite	137,978	148,777	157,721	155,851	154,323
United Kingdom: Bituminous and anthracite	248,646	250,464	241,723	230,841	216,839
Yugoslavia:					
Bituminous	1,358	1,353	1,332	1,431	1,414
Lignite	17,493	18,497	19,597	21,836	23,623
Total [4]	1,615,347	1,674,796	1,716,750	1,713,724	1,737,908
Asia:					
Afghanistan: Bituminous	26	30	37	40	52
Burma: Bituminous	1	1		1	(5)
China: Bituminous, anthracite, and lignite	116,700	144,100	297,600	383,400	463,000
India: Bituminous	43,994	48,491	50,654	52,668	58,136
Indonesia: Bituminous	913	790	665	703	724
Iran: Bituminous [6]	209	194	214	257	[3] 250
Japan:					
Bituminous and anthracite	51,318	57,025	54,756	52,093	56,297
Lignite	1,676	1,832	1,744	1,619	1,548
Korea:					
North: Anthracite and lignite [3]	4,500	5,500	7,600	8,300	8,800
Republic of: Anthracite	2,001	2,691	2,944	4,559	5,897
Malay: Bituminous	204	171	75	85	8
Outer Mongolia: Lignite and bituminous [3]	375	450	550	665	660
Pakistan: Bituminous and lignite	722	578	669	820	918
Philippines: Bituminous	168	211	119	154	163
Ryukyu Islands: Bituminous		2	1	1	1
Taiwan: Bituminous	2,788	3,214	3,508	3,928	4,367
Thailand: Lignite	96	110	138	155	164
Turkey (mined):					
Bituminous	6,490	6,917	7,234	7,191	6,952
Lignite	3,318	4,009	4,212	4,038	3,760
Vietnam:					
North: Anthracite	1,340	1,200	1,980	2,260	[3] 3,300
South: Anthracite	2	13	22	22	30
Total [4]	236,841	277,529	434,722	522,959	615,027
Africa:					
Algeria: Bituminous and anthracite	327	260	169	134	131
Congo, Republic of the (formerly Belgian): Bituminous	463	477	324	294	195
Malagasy, Republic of: Bituminous		1			
Morocco: Southern zone: Anthracite	531	574	562	513	454
Mozambique: Bituminous	240	298	273	283	287
Nigeria: Bituminous	882	913	1,036	831	629
Rhodesia and Nyasaland, Federation of: Southern Rhodesia: Bituminous	3,918	4,247	3,897	4,144	3,923
Swaziland: Anthracite and bituminous				1	13
Tanganyika: Bituminous	2	1	1	2	2
Union of South Africa: Bituminous and anthracite (marketable)	37,040	38,325	40,879	40,181	42,078
Total	43,403	45,096	47,141	46,383	47,712

See footnotes at end of table.

TABLE 71.—World production of bituminous coal, anthracite, and lignite, by countries[1]—Continued

(Thousand short tons)

Country	1956	1957	1958	1959	1960[2]
Oceania:					
Australia:					
Bituminous	21,587	22,310	22,895	22,734	25,286
Lignite	11,827	12,030	13,041	14,599	16,763
New Zealand.					
Bituminous and anthracite	897	931	939	941	917
Lignite	2,046	1,994	2,108	2,205	2,460
Total	36,357	37,265	38,983	40,479	45,426
Other countries (estimate)	110	110	110	110	110
Lignite (total of items shown above) (estimate)	624,169	655,754	678,596	682,946	708,330
Bituminous and anthracite (by subtraction)	1,861,581	1,919,412	2,011,852	2,093,758	2,192,635
World total, all grades (estimate)	2,485,750	2,575,166	2,690,448	2,776,704	2,900,965

[1] This table incorporates some revisions.
[2] Preliminary.
[3] Estimate.
[4] Output from U.S.S.R. in Asia (including Sakhalin) included with U.S.S.R. in Europe.
[5] Less than 500 tons.
[6] Year ended March 20 of year following that stated.

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

COAL TECHNOLOGY

As in the past several years, Congressional and public interest in expanded coal research to improve the economic position of the industry remained high. Legislative activity in this area resulted in the enactment of Public Law 86–599, which established within the Department of the Interior an Office of Coal Research. The purpose of the new office was to contract for coal research for the purpose of encouraging and stimulating the production and conservation of coal. An initial appropriation of $1 million for the Office of Coal Research was granted by the Congress.

Approval for constructing a new central coal research laboratory for the Bituminous Coal Research, Inc., was announced by the National Coal Association. The new $875,000 laboratory will be erected on a 29-acre site in Monroeville, Pa., and will consolidate the research facilities now maintained by Bituminous Coal Research in Columbus, Ohio, and Pittsburgh, Pa.

New efforts were exerted by the coal industry to secure legislative action that would lead to the establishment of a national fuel policy for the United States, covering all energy resources.

Bureau of Mines experiments in using water jets under high pressure to extract coal from the solid have shown conclusively that this mining method can be used under certain conditions to achieve high productivity at the working face.

A giant 115-yard shovel will soon begin operating in a large new open-pit mine under development in western Kentucky. The machine will have a total working weight of 7,000 tons and will require more than 12,000 horsepower to operate. At the projected stripping rate, about 15,000 tons of coal will be uncovered daily.

A new wheel-type excavator is presently moving 3,500 cubic yards of overburden hourly, working at elevations up to 100 feet above the coalbed. After discharge from the wheel, the material is moved in a continuous stream at speeds of 1,225 feet per minute on an endless belt conveyor, a maximum distance of 420 feet to the spoil area.

To combat the effect of corrosive materials usually present in mining areas, an all-aluminum mine car started operating in a West Virginia coal mine. With a weight roughly one-half that of a comparable steel car, the new car will carry about seven times its weight in payload and is expected to have an estimated service life of about 20 years, 5 to 10 years longer than the average steel car.

A new coal sampler was developed to obtain samples of truck-delivered coal at the Kingston steamplant of the Tennessee Valley Authority. Consisting of a hollow tube, the sampler is pushed into the coal with an airhammer or piledriver. After penetrating to the bottom of the coal pile, two hinged leaves at the tube's bottom close and enclose the sample in the tube.

The largest filter ever manufactured for the coal industry was installed in a Virginia coal preparation plant. The filter has 14 rotary discs that measure 12½ feet in diameter. Its overall length is 27 feet. In operation, the filter will have over 2,750 square feet of filter area and will dewater refuse material at a rate of 75 to 100 tons per hour.

Plans are continuing for the construction of a coal pipeline across the state of Pennsylvania, which will move coal from the mining areas of western Pennsylvania to utility plants along the Atlantic seaboard. The coal feed to the line will be finely ground before being made into slurry, and the resulting coal-water mixture is reported to have very favorable stability characteristics.

Consideration is also being given to the possibility of transporting coal in oil pipelines, using oil as the transport medium.

The success of the commercial coal pipeline in Ohio has resulted in the coal industry of Western Germany making an active study of the economic feasibility of moving coal through a 300-mile pipeline capable of handling 3 million metric tons annually.

To supply a coal char for use in a number of chemical operations, a West Virginia coal company erected a $6-million processing plant to process coal from the Cedar Grove bed.

Plans were announced to extract aluminum sulfate from coal-mine wastes. The plant to be erected adjacent to an Ohio coal mine is expected to produce 40,000 tons of the sulfate annually. Eventually it is hoped that the coal-mine wastes can be used to obtain other chemicals such as aluminum oxide and iron oxide.

After extensive research, engineers of a large electric generating station discovered that fly ash could be utilized effectively as an additive compound in roadbuilding. By mixing fly ash and lime with sand and the aggregates under proper conditions, a material of great strength is developed. Claims have been made that roads built with this compound can be opened to traffic rapidly, since no setting time is required.

Important changes in blast-furnace operation occurred with the innovation of injecting natural gas into the air-blast to achieve significant reduction in the coke rate. Oil and pulverized coal have been substituted successfully for the natural gas.

A rapid analysis method was developed for determining pyritic sulfur in coal. The time for analysis has been reduced from 48 hours by the standard test method to less than 2 hours by the new method.

A generating cycle combining a steam turbine and a gas turbine, to be installed in an Ohio powerplant, will be used for the first time in producing electric energy by a coal-burning plant. The gas turbine of 5,000 kilowatt capacity will be driven by coal gas. Objective of the combined cycle is added efficiency of generation, and an improvement of 4 percent in overall efficiency is expected.

A novel magnetohysodynamic (MHD) generator powered by combustion of conventional fuel was developed. Unlike earlier MHD generators, which use an electric arc to produce the electrically conductive gas plasma, the new unit burns furnace oil with oxygen to produce high temperature gas. A potassium compound contained in the fuel is ionized to provide free electrons. As the hot gases speed through a water-cooled, refractory-lined tube, a magnetic field at right angles to the line of flow deflects the electrons to graphite electrodes, which conduct the electric current to an external load.

A detailed report on coal technological activities of the Bureau of Mines is published annually.

Coal—Pennsylvania Anthracite

By Forrest T. Moyer,[1] J. A. Vaughan,[2] and Marian I. Cooke[3]

CONTENTS

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,

[1] Physical scientist.
[2] Commodity industry analyst.
[3] Commodity research assistant

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	986
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	1,054,562	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	43,996	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 1920.
[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 [2] 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.

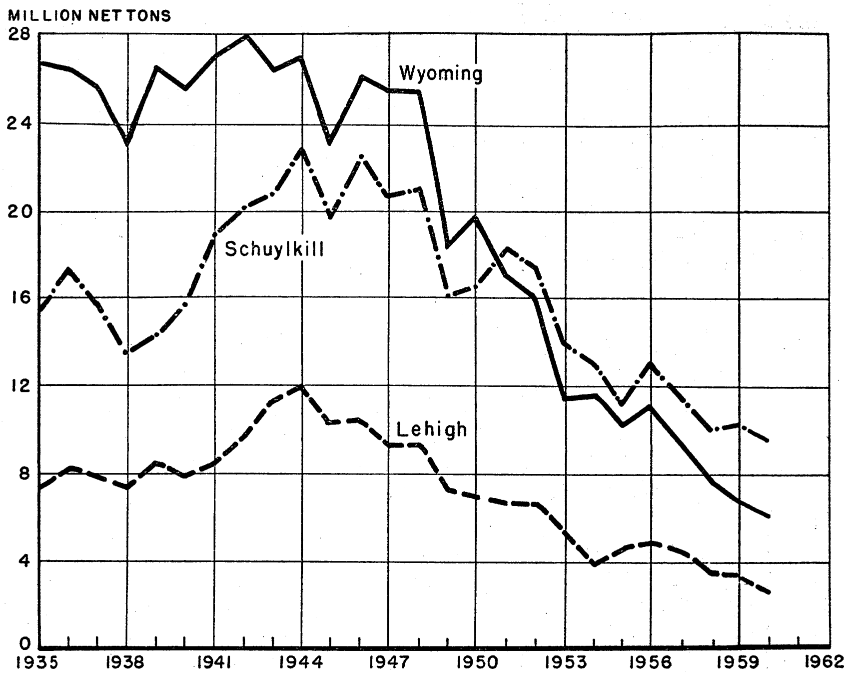

FIGURE 1.—Pennsylvania anthracite shipped from the Lehigh, Schuylkill, and Wyoming regions, 1935–60.

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	------	------	------		
Egg	1.6	1.5	1.2	.9	.9	------	------	------		
Stove	25.4	22.0	23.4	21.2	19.7	------	------	6.6	(3)	(3)
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		
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	(3)	(3)
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			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	(3)	(3)	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			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	(3)	(3)	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				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	1.9	1.0	------	------	------	------	------	------		
Egg	.2	.1	0.1	0.1	0.1	------	------	------		
Stove	1.9	2.3	2.5	2.8	2.2	------	------	------	(4)	(4)
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		
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	------	------	(4)	(4)
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				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	1.0	0.5	(2)			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	(4)	(4)	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			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	(4)	(4)	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

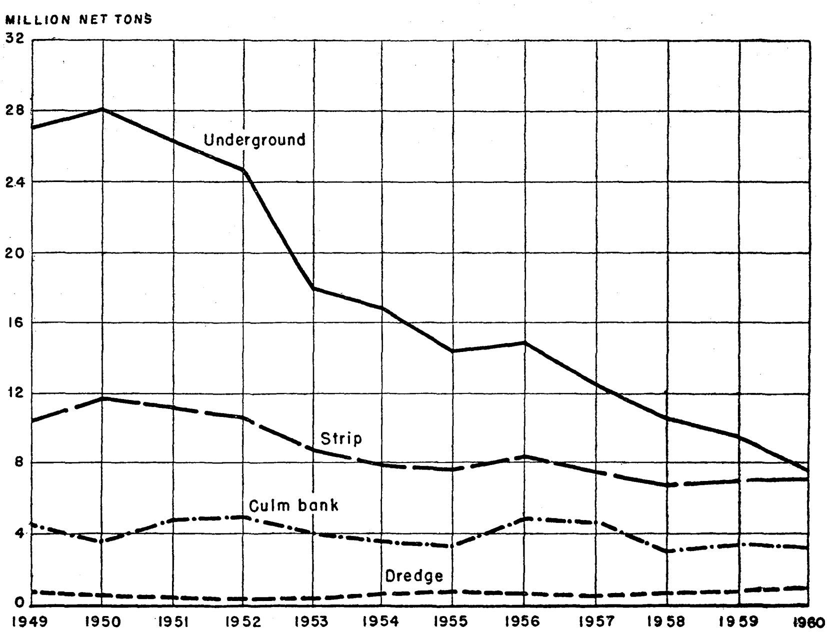

FIGURE 2.—Production of Pennsylvania anthracite, by sources, 1949–60.

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

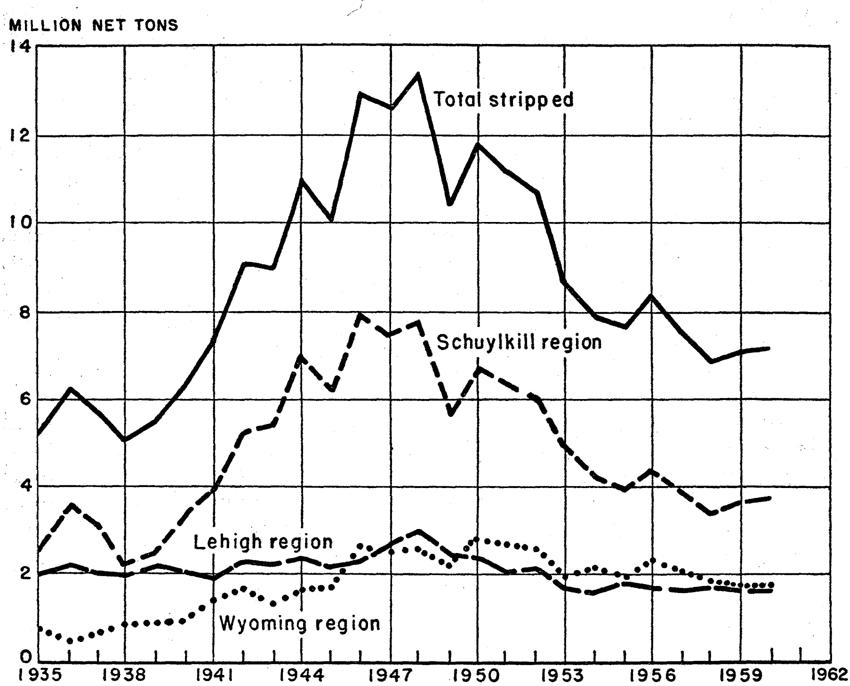

FIGURE 3.—Pennsylvania anthracite mined from strip pits by regions, 1935–60.

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. Compared 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.

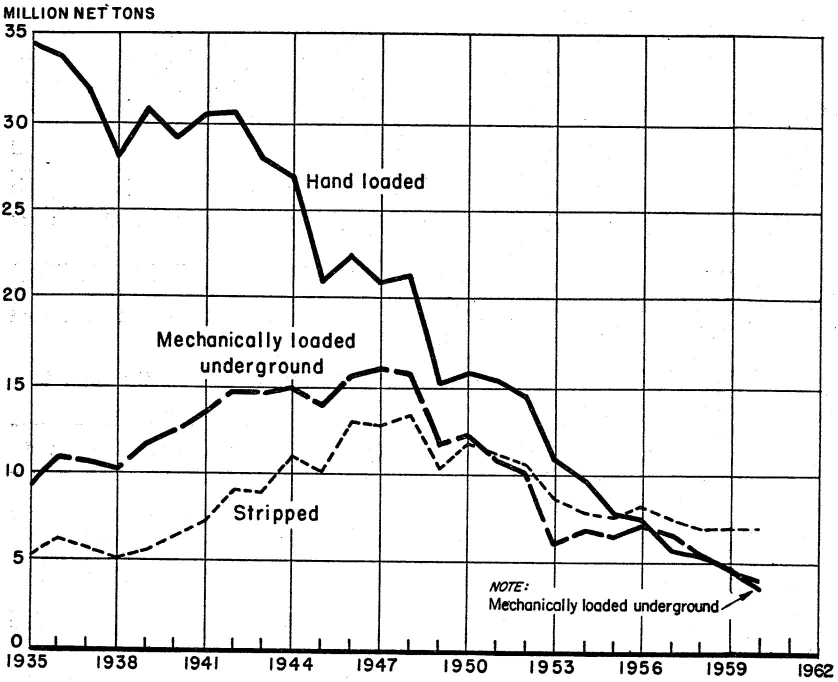

FIGURE 4.—Pennsylvania anthracite mechanically loaded, hand loaded, and stripped, 1935–60.

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							
	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	Total
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 draglines	Total	Number of power shovels	Number of draglines	Total	Number of power shovels	Number of draglines	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

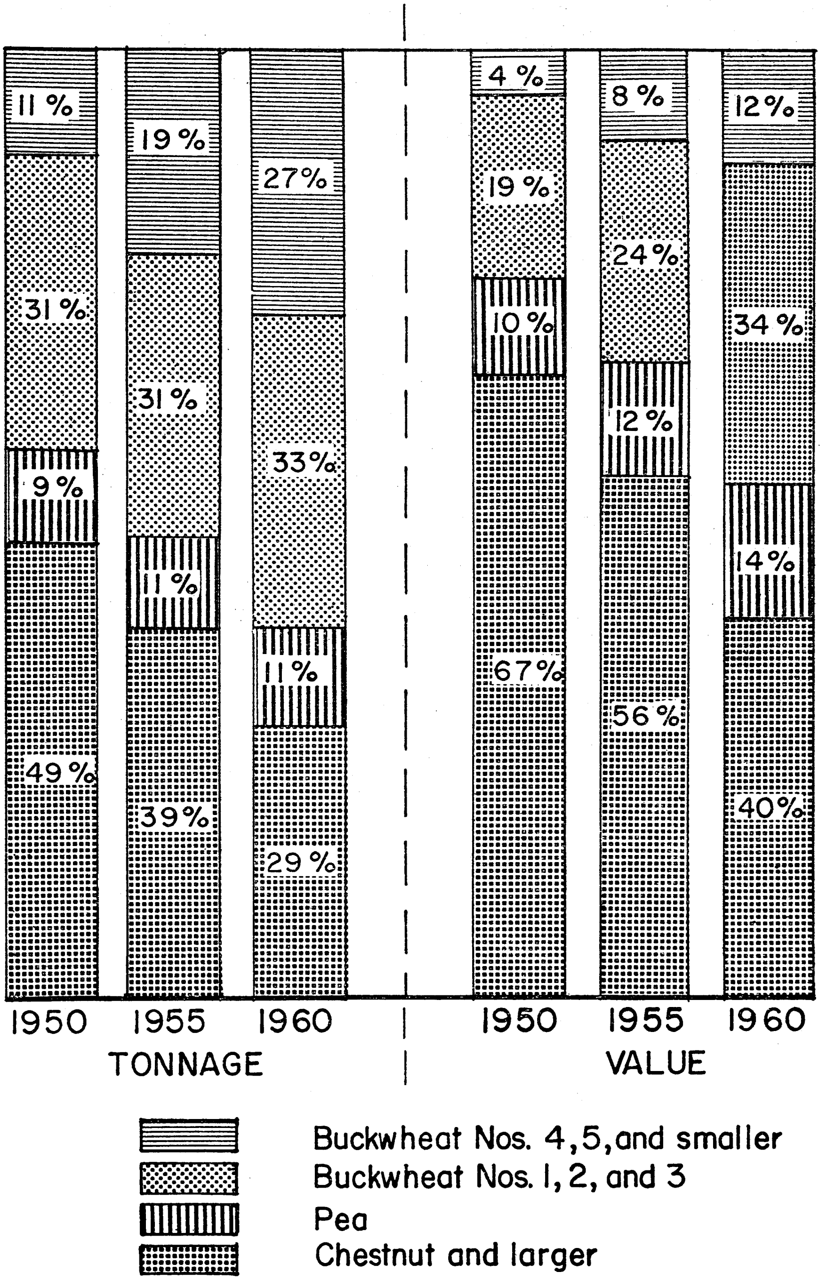

FIGURE 5.—Shipments of Pennsylvania anthracite, 1950, 1955, and 1960, by size groups, in percent of total tonnage and total value

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 13/16		15	7½			
Pea	Through 13/16	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	-------	-------	-------		
Egg	11.70	12.33	11.87	11.21	10.40	-------	-------	-------		
Stove	12.06	12.97	12.17	11.27	10.68	-------	-------	$12.07	(2)	(2)
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		
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	(2)	(2)
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			$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	(2)	(2)	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			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	(2)	(2)	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	------	------	------	------	------	------		
Egg	12.54	12.89	$13.65	$11.67	$11.22	------	------	------		
Stove	13.38	14.19	13.40	12.55	12.01	------	------	------	(2)	(2)
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		
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	------	------	------	(2)	(2)
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			$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	(2)	(2)	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			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	(2)	(2)	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	Total 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
Untied 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.

Coke and Coal Chemicals

By J. A. DeCarlo,[1] T. W. Hunter,[2] and Maxine M. Otero [3]

Contents

GENERAL SUMMARY

PRODUCTION of oven and beehive coke in the United States in 1960 increased 2 percent over 1959, but was 19 percent below the average output of the benchmark period, 1947–49. The slight increase in coke output was due to the gain in oven-coke manufacture as beehive production dropped 6 percent. High production of oven coke in the first quarter averaged 6.1 million tons per month but dropped steadily in the following quarters to 5.2 million tons in the second, 3.8 million tons in the third, and 3.6 million tons in the last quarter. Output of beehive coke was largest in the first quarter and dropped in the succeeding quarters. The total output of beehive coke in 1960 was only 2 percent of the total oven-and beehive-coke production, about one-fifth the average output of 1947–49.

The close relationship between production of coke and pig-iron is clearly illustrated in figure 1. As shown in this figure, the highest rates for both oven coke and pig iron during 1960 were reached in February, when blast furnaces operated at 96.7 percent of capacity and slot-type coke ovens at 90.7 percent. The slackening in industrial activity in the later part of the year resulted in a steady decline in

[1] Chief, Section of Coke and Coal Chemicals.
[2] Chief, Branch of Bituminous Coal Economics.
[3] Supervisory statistical assistant.

rates of both pig iron and coke, reaching a low in December when blast furnaces operated at only 47.3 percent of capacity and coke ovens at 49.5. Although coke is used primarily as an industrial fuel, the coke industry was affected by the decline in industrial activity to a greater extent than many other businesses. According to the Federal Reserve Board, the index for industrial production averaged 108.3, using 1957 as 100-percent. The production index for the coke industry, using the same base year, was only 75 because the year 1957 ranked third for coke production.

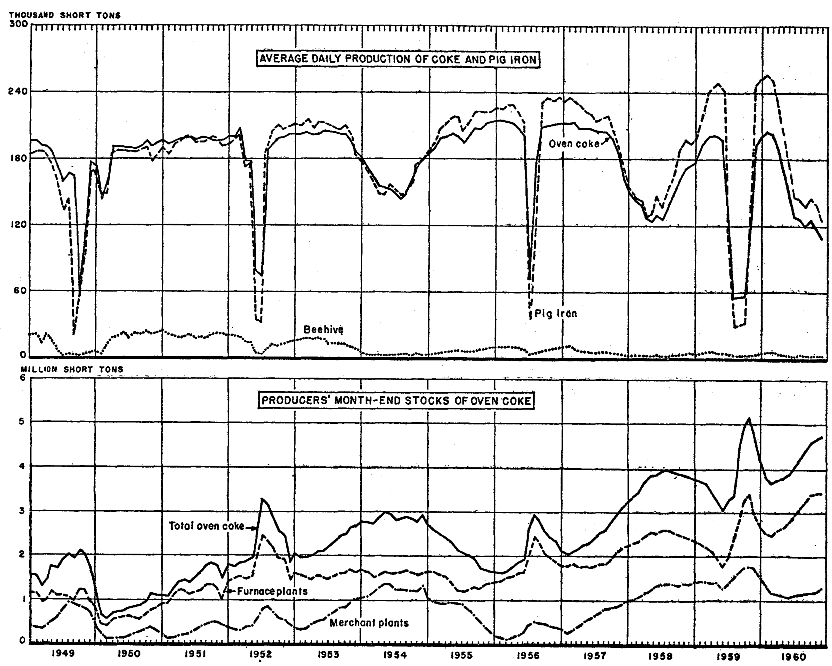

FIGURE 1.—Average daily production of oven and beehive coke and pig iron and producers' stocks of oven coke, by months.

The supply of coke in 1960 was more than adequate to meet demand, and producers' stocks increased 1 percent, or 55,652 tons. Shipments to blast-furnace plants and to "other industrial plants" increased slightly, whereas shipments to foundries, for producer- and water-gas manufacture, residential heating, and exports declined. The largest decrease among the coke-consuming groups for which statistics are collected was in shipments to gas plants, which dropped 52 percent from 1959. Gas manufacture furnished the third largest coke market in the 1940's but since then has declined sharply and in 1960 was no longer a major use. Another market for coke that has decreased continuously in the past 2 decades was in residential or space heating. Shipments for this purpose amounted to less than 1 percent of the total coke disposal, compared with 14 percent in 1940. Shipments to blast-furnace plants increased 5 percent over 1959 and amounted to 91 percent of the total coke used and sold by producers. The most significant development in the use of coke was an accelerated decline in coke rates in blast furnaces, dropping 4 percent, or 69.8 pounds per ton of pig iron and ferroalloys. Coke rates have declined steadily for the past decade because of improvements in the chemical and physical properties of coke, richer burdens, and advancements in blast-furnace technology. Gaseous-fuel injection, a blast-furnace technique, was successfully used by a few iron and steel companies and may lower coke rates substantially. The adoption of supplemental-fuel injection together with other improvements in blast-furnace burdens caused some iron and steel engineers to predict that blast-furnace coke rates in the near future would drop below 1,000 pounds per ton of hot metal.

Coke used for miscellaneous industrial purposes, which the Bureau of Mines classifies as "other industrial", increased 7 percent. Coke reported in this category is used for chemical processing, nonferrous smelting, lime burning (for soda-ash and beet-sugar manufacture), electro-metallurgical furnaces (reduction of ferroalloys), and a wide variety of other purposes. The largest use in this group is in manufacturing calcium carbide, estimated at more than 700,000 tons.

Production of coke screenings or breeze declined slightly from the 1959 output. For many years this material was used primarily for generating steam at or near producing plants. In the past decade, however, the consumption of breeze has changed markedly mainly because of the rapid increase in its use for agglomerating iron ore and smelting phosphate rock. In 1960, only 31 percent of the coke breeze production was used by producers for generating steam, 36 percent, for agglomerating iron ore at blast-furnace plants; 39 percent was sold or used for miscellaneous industrial applications, including production of elemental phosphorus. The increased demand for breeze caused the average value per ton of breeze sold to be 118 percent higher than in 1947–49. Most of the breeze used in phosphate furnaces in the Western States, Tennessee, and Florida was shipped by rail over great distances, adding considerably to its delivered price at these installations.

Coking-coal costs are extremely important to coke-plant operators because coal represents a major part of the total manufacturing costs of coke. The average value per ton of coal delivered to both oven- and beehive-coke plants was $9.82, an increase of $0.02 per ton. Increased productivity in the bituminous-coal industry, through mechanization of mines, held coal prices down in spite of increases in miner's wages and freight rates. According to price indexes published by the Bureau of Labor Statistics, the index for metallurgical-quality high-volatile coal, f. o. b. mines, decreased in 1960. The Bureau of Labor Statistics, using 1958 as a base year for measuring coal-price trends, showed that the index for metallurgical-quality high-volatile coal, f. o. b. mines, dropped from 98 in January 1960, to 97.4 in December;

low- and medium-volatile metallurgical coal remained at 96 throughout the year. This same source showed that the f. o. b.-mine price of high-volatile coal dropped from $6.379 per ton to $6.343; low-volatile coal remained at $6.73 per ton. Increases in freight rates, however, brought up the delivered price to oven-coke plants to the same figure as 1958.

In 1960, a total of 952 slot-type coke ovens were taken out of production, the largest number on record. Most of the ovens or 671 were shut down and dismantled for constructing new ovens (rebuilds or replacements); only 301 were abandoned permanently. A total of 282 ovens with an annual coke capacity of 1,556,000 short tons were completed and placed in operation during the year, and 372 ovens with an annual coke capacity of 2,118,200 short tons were under construction at the close of the year. Thus, for the second consecutive year, the number of ovens and coke capacity declined. At the end of 1960, the oven-coke industry had 15,323 slot-type ovens in existence with an annual coke capacity of 78,876,900 short tons.

For the first time in several years, the number of beehive ovens at the end of the year was larger than at the beginning. The gain in number of beehive ovens was due to constructing two new beehive-coke plants, one in Pennsylvania and one in Kentucky, raising the number of beehive ovens from 7,448 to 7,583 and the annual coke capacity from 4,368,800 tons to 4,615,900 tons.

Output of the basic coal-chemical materials in 1960 increased over the 1959 figures mainly because more coal was carbonized in slot-type coke ovens and also because of the increase in yields. When compared with 1959 production, crude-light-oil output increased 10 percent; crude tar, 5 percent; ammonia (sulfate equivalent of all forms), 3 percent; and coke-oven gas, 4 percent. Increased crude-light-oil supply made more available for refining at coke plants and resulted in manufacturing gains in all light-oil derivatives. Benzene, the most important derivative, was in tight supply throughout the year, causing the average price of coke-oven benzene to increase from an average of $0.289 per gallon to $0.321. Probably the most important development in 1960 relating to the production of aromatic chemicals (benzene, toluene, xylene, naphthalene, and others) was the tremendous expansion program started in the petroleum industry. The impetus for beginning this expansion program was the anticipated increase in benzene requirements, which will be much higher than can be obtained from coal carbonization and imports.

Imports of benzene, which had averaged about 65 million gallons per year for the 1955–59 period, dropped to 40 million gallons in 1960. Imports are expected to decline because of increased requirements in countries now exporting to the United States. Another factor that influenced the petroleum industry to accelerate the expansion program was the anticipated 60-percent increase in demand for benzene within the next several years. Coke-oven benzene capacity was not expected to exceed 200 million gallons by 1965; but planned expansion in the petroleum industry, if completed, would bring the capacity of petroleum benzene in 1965 to more than 700 million gallons or roughly 60 percent more than capacity in existence on December 31, 1960.

All of the naphthalene produced in the United States in 1960 was derived from coal, but a plant designed to produce about 100 million pounds a year from petroleum-feed stocks was under construction near Catlettsburg, Ky., and was expected to start producing naphthalene early in 1961. Several other petroleum companies were beginning construction and planned to be in operation early in 1962. Several of the major coal-tar naphthalene producers began recovering and marketing methyl naphthalene in 1960. This procedure made available more material for manufacturing phthalic anhydride, an intermediate chemical that uses about 85 percent of all naphthalene in the United States. Although yields of phthalic anhydride from methyl naphthalene are not as high as when naphthalene alone is used, this shortcoming was more than offset by increasing the quantity of raw materials that could be made available when supplementing methyl naphthalene to naphthalene supplies. Statistics on naphthalene production at coke plants could not be published unless combined with production at tar refineries, but it can be stated that output increased substantially at coke plants. Naphthalene imports declined—a factor in keeping naphthalene supplies in tight position.

Pitch-of-tar sales by coke-plant operators continued to increase in 1960, rising 112 percent over 1959, and value of sales exceeded $5 million. Roughly 80 percent of the coal-tar-pitch production at coke plants was used as fuel in integrated open-hearth furnaces. As the economic value of this pitch is determined largely by its fuel value, several major pitch-producing companies were considering producing and marketing special pitch products to enhance its economic importance to the producing companies.

One of the coal chemicals that caused coke-oven operators concern in 1960 was ammonium sulfate. High manufacturing costs and lower selling prices placed coke-oven operators in an unfavorable economic position. Also increased use of anhydrous ammonia, ammonia solutions, and high-nutrient fertilizers (urea, diammonium phosphate, and others) for agricultural purposes held down ammonium sulfate sales. Consequently, stocks of ammonium sulfate at coke plants increased 38 percent during the year.

The total value of the coal carbonized in 1960 amounted to nearly $799 million. The value of all coal-chemical materials that were used and sold and of coke and breeze that were produced was $1.4 billion, 73 percent more than the value of the coal. The value of coke and breeze produced amounted to 78 percent of the value of all products. Coal-chemical materials, including surplus gas, comprised the remainder. Table 1 contains salient statistics of the coke industry, and table 2 is a statistical summary of the coke industry in 1960.

SALIENT STATISTICS

TABLE 1.—Salient coke statistics

	1947–49 (average)	1959	1960
United States:			
Production:			
Oven ... short tons	65,088,462	54,789,276	56,219,108
Beehive ... do	5,559,940	1,074,296	1,009,610
Total ... do	70,648,402	55,863,572	57,228,718
Imports ... do	181,000	123,255	125,160
Exports ... do	696,502	460,222	353,016
Producers' stocks, Dec. 31 ... do	[1] 1,769,456	4,682,436	4,738,088
Consumption, apparent ... do	69,852,671	54,667,533	56,945,210
Ovens:			
Slot-type, in existence, Dec. 31	[1] 15,104	15,993	15,323
Annual coke capacity, Dec. 31 ... short tons	[1] 73,710,100	81,447,700	78,876,900
Beehive, in existence, Dec. 31	[1] 13,662	7,448	7,583
Annual coke capacity, Dec. 31 ... short tons	[1] 8,672,200	4,368,800	4,615,900
Value of coal-chemical materials used or sold	$254,681,622	$288,153,722	$306,745,388
Value of coke and breeze produced	867,047,809	1,017,789,999	1,075,444,111
Total value of all products	1,121,729,431	1,305,943,721	1,382,189,499
World:			
Production:			
Hard coke ... thousand short tons	159,100	[2] 289,689	306,830
Gashouse and low-temperature coke ... do	(3)	[2] 50,670	51,300

[1] 1949.
[2] Revised figure.
[3] Not available.

STATISTICAL SUMMARY

TABLE 2.—Statistical summary of the coke industry in the United States in 1960

	Slot type ovens	Beehive ovens	Total
Coke produced:			
At merchant plants:			
Short tons	6,364,540	(2)	(2)
Value	$134,553,708		
At furnace plants: [1]			
Short tons	49,854,568		
Value	$898,614,149		
Total:			
Short tons	56,219,108	1,009,610	57,228,718
Value	$1,033,167,857	$14,752,563	$1,047,920,420
Breeze produced:			
Short tons	3,705,446	37,669	3,743,115
Value	$27,436,205	$87,486	$27,523,691
Coal carbonized:			
Bituminous:			
Short tons	79,373,267	1,641,410	81,014,677
Value	$784,980,277	$10,025,391	$795,005,668
Average per ton	$9.89	$6.11	$9.81
Anthracite:			
Short tons	370,262		370,262
Value	$3,818,526		$3,818,526
Average per ton	$10.31		$10.31
Total:			
Short tons	79,743,529	1,641,410	81,384,939
Value	$788,798,803	$10,025,391	$798,824,194
Average per ton	$9.89	$6.11	$9.82
Average yield in percent of total coal carbonized:			
Coke	70.50	61.51	70.32
Breeze (at plants actually recovering)	4.65	4.82	4.65

See footnotes at end of table.

TABLE 2.—Statistical summary of the coke industry in the United States in 1960—Continued

	Slot-type ovens	Beehive ovens	Total
Coke used by producing companies:			
In blast furnaces:			
Short tons	47,729,475	31,395	47,760,870
Value	$859,870,647	(3)	(3)
In foundries:			
Short tons	199,251		199,251
Value	$6,370,141		$6,370,141
For producer- and water-gas manufacture:			
Short tons	76,343		76,343
Value	$1,332,926		$1,332,926
For other industrial uses:			
Short tons	597,354		597,354
Value	$10,713,001		$10,713,001
Breeze used by producing companies:			
In steam plants:			
Short tons	1,142,730		1,142,730
Value	$6,941,468		$6,941,468
In agglomerating plants:			
Shorts tons	1,343,515		1,343,515
Value	$11,155,457		$11,155,457
For other industrial uses:			
Short tons	479,740		479,740
Value	$3,109,697		$3,109,697
Coke sold (commercial sales):			
To blast furnaces:			
Short tons	3,485,549	591,453	4,077,002
Value	$55,151,975	$8,886,408	$64,038,383
Average per ton	$15.82	$15.02	$15.71
To foundries:			
Short tons	2,222,542	6,892	2,229,434
Value	$67,326,685	$108,613	$67,435,298
Average per ton	$30.29	$15.76	$30.25
To water-gas plants:			
Short tons	32,820		32,820
Value	$596,609		$596,609
Average per ton	$18.18		$18.18
To other industrial plants:			
Short tons	1,391,830	384,570	1,776,400
Value	$22,584,318	$5,303,061	$27,887,379
Average per ton	$16.23	$13.79	$15.70
For residential heating:			
Short tons	396,927	451	397,378
Value	$6,845,119	$6,488	$6,851,607
Average per ton	$17.25	$14.39	$17.24
Breeze sold (commercial sales):			
Short tons	936,241	35,999	972,240
Value	$7,953,878	$85,241	$8,039,119
Average per ton	$8.50	$2.37	$8.27
Coal-chemical materials:			
Crude tar:			
Production, gallons	687,559,703		687,559,703
Yield per ton of coal, do	8.62		8.62
Ammonia: [4]			
Production, short tons	735,441		735,441
Yield per ton of coal, pounds	18.80		18.80
Crude light oil:			
Production, gallons	234,500,663		234,500,663
Yield per ton of coal, do	2.99		2.99
Gas:			
Production, M cubic feet	835,292,413		835,292,413
Yield per ton of coal, do	10.47		10.47
Burned in coking process, percent	35.89		35.89
Surplus sold or used, do	62.35		62.35
Wasted, do	1.76		1.76
Value of coal-chemical materials sold:			
Crude tar and derivatives:			
Sold	$67,788,886		$67,788,886
Used	$32,453,750		$32,453,750
Ammonia products [5]	$21,844,671		$21,844,671
Crude light oil and derivatives [6]	$58,922,666		$58,922,666
Surplus gas	$125,735,415		$125,735,415

[1] Plants associated with iron blast furnaces (refer to definition in Scope of Report).
[2] Not separately recorded.
[3] Concealed to avoid disclosing individual company figures.
[4] In terms of sulfate equivalent.
[5] Includes ammonium sulfate, ammonia liquor (NH_3 content), ammonium thiocyanate, and di- and mono-ammonium phosphate.
[6] Includes intermediate light oil.

TABLE 3.—Summary of oven-coke operations in the United States in 1960, by States

State	In existence Dec. 31 [1]		Coal carbonized (short tons)	Yield of coke from coal (percent)	Coke produced (short tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Alabama	7	1,451	6,718,458	72.89	4,897,286	$99,558,578	$20.33
California, Colorado, and Utah	4	829	4,504,555	63.05	2,840,131	71,450,903	25.18
Connecticut, Maryland, Massachusetts, New Jersey, and New York	6	1,905	9,914,668	71.32	7,071,167	119,710,542	16.93
Illinois	6	507	2,874,399	68.57	1,971,107	37,108,601	18.83
Indiana	5	2,191	11,155,151	71.93	8,024,273	156,066,508	19.45
Kentucky, Missouri, Tennessee, and Texas	5	420	2,749,175	71.76	1,972,816	37,266,880	18.89
Michigan	4	769	4,439,025	73.86	3,278,739	59,657,982	18.20
Minnesota and Wisconsin	4	400	1,188,272	70.36	836,072	19,734,512	23.60
Ohio	14	2,368	11,738,938	71.75	8,423,246	142,066,358	16.87
Pennsylvania	14	3,792	20,422,815	69.27	14,146,269	242,467,506	17.14
West Virginia	4	691	4,038,073	68.30	2,758,002	48,079,487	17.43
Total 1960	73	15,323	79,743,529	70.50	56,219,108	1,033,167,857	18.38
At merchant plants	19	2,025	8,900,616	71.51	6,364,540	134,553,708	21.14
At furnace plants	54	13,298	70,842,913	70.37	49,854,568	898,614,149	18.02
Total 1959	74	15,993	77,722,907	70.49	54,789,276	976,343,886	17.82

[1] Excludes plants retired permanently during year.

TABLE 4.—Summary of beehive-coke operations in the United States in 1960, by States

State	In existence Dec. 31 [1]		Coal carbonized (short tons)	Yield of coke from coal (percent)	Coke produced (short tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Pennsylvania	33	6,208	1,088,515	62.86	684,250	$9,704,321	$14.18
Kentucky, Virginia, and West Virginia	10	1,375	552,895	58.85	325,360	5,048,242	15.52
Total 1960	43	7,583	1,641,410	61.51	1,009,610	14,752,563	14.61
Total 1959	45	7,448	1,827,474	58.78	1,074,296	15,740,926	14.65

[1] Excludes plants retired permanently during year.

TABLE 5.—Historical statistics of the coke industry in the United States

Year	Production (million short tons)			Percent of production from slot-type ovens	Ovens in existence		Slot-type ovens under construction at end of year	Coal charged (million short tons)	Yield of coke from coal (percent)	Average value of coke per ton at plant	Total value at plant (million dollars) [1]			
	Oven coke	Beehive coke	Total		Slot type	Beehive					Oven coke and breeze produced	Beehive coke and breeze produced	All coal-chemical materials	Total coke and coal-chemical materials
1880	------	3.3	3.3	------	------	12,372	------	5.2	63.7	$1.99	-------	7	------	7
1890	------	11.5	11.5	------	------	37,158	------	18.0	63.9	2.02	-------	23	------	23
1900	1.1	19.4	20.5	5.2	1,085	57,399	1,096	32.1	63.9	2.31	2	45	(2)	(2)
1910	7.1	34.6	41.7	17.1	4,078	100,362	1,200	63.1	66.1	2.39	25	75	8	108
1911	7.9	27.7	35.6	22.1	4,624	99,255	698	53.3	66.7	2.37	27	57	10	94
1912	11.1	32.9	44.0	25.3	5,211	97,019	793	65.6	67.1	2.54	43	69	14	126
1913	12.7	33.6	46.3	27.5	5,688	96,962	504	69.2	66.9	2.78	49	80	17	146
1914	11.2	23.4	34.6	32.5	5,809	93,946	644	51.6	66.9	2.56	38	50	18	106
1915	14.1	27.5	41.6	33.8	6,268	93,110	1,191	61.8	67.2	2.54	49	57	30	136
1916	19.1	35.4	54.5	35.0	7,283	91,581	2,084	81.6	66.8	3.13	77	96	60	233
1917	22.4	33.2	55.6	40.4	7,869	88,027	2,260	83.8	66.4	5.36	141	160	65	366
1918	26.0	30.5	56.5	46.0	9,279	84,635	1,815	85.0	66.4	6.77	205	190	75	470
1919	25.1	19.1	44.2	56.9	10,379	82,560	877	65.6	67.4	5.85	163	98	64	325
1920	30.8	20.5	51.3	60.0	10,881	75,298	396	76.2	67.4	9.27	317	182	101	600
1921	19.8	5.5	25.3	78.1	11,142	66,014	85	37.2	68.0	5.84	121	30	65	216
1922	28.5	8.6	37.1	76.9	11,212	63,958	403	54.3	68.3	6.42	194	50	90	334
1923	37.6	19.4	57.0	66.0	11,156	62,349	629	84.4	67.5	6.56	267	116	122	505
1924	34.0	10.3	44.3	76.8	11,413	60,432	247	65.0	68.1	5.51	202	49	114	365
1925	39.9	11.4	51.3	77.9	11,290	57,587	429	74.5	68.8	5.12	220	52	134	406
1926	44.4	12.5	56.9	78.0	11,716	52,558	978	82.9	68.6	5.41	260	58	148	466
1927	43.9	7.2	51.1	85.9	12,475	49,795	289	74.4	68.6	5.13	241	30	152	423
1928	48.3	4.5	52.8	91.5	12,544	41,288	145	77.2	68.4	4.79	246	16	166	428
1929	53.4	6.5	59.9	89.2	12,649	30,082	408	86.8	69.0	4.66	267	23	180	470
1930	45.2	2.8	48.0	94.2	12,831	23,907	276	69.8	68.7	4.36	209	9	157	375
1931	32.4	1.1	33.5	96.6	13,108	21,588	------	48.6	68.9	4.83	165	4	117	286
1932	21.1	.7	21.8	97.0	13,053	19,440	------	31.9	68.3	4.79	107	2	83	192
1933	26.7	.9	27.6	96.7	13,053	16,857	------	40.1	68.7	4.46	125	3	90	218
1934	30.8	1.0	31.8	96.8	12,963	14,206	------	46.0	69.2	5.01	161	4	98	263
1935	34.2	.9	35.1	97.4	12,860	13,674	122	50.5	69.6	5.03	179	4	108	291
1936	44.6	1.7	46.3	96.3	12,849	13,012	305	65.9	70.2	5.02	233	6	128	367
1937	49.2	3.2	52.4	94.0	12,718	12,194	259	74.5	70.3	4.98	255	14	141	410
1938	31.7	.8	32.5	97.4	12,724	10,816	146	46.6	69.7	5.14	169	4	107	280
1939	42.9	1.4	44.3	96.7	12,732	10,934	------	63.5	69.8	4.80	214	6	132	352
1940	54.0	3.1	57.1	94.6	12,734	15,150	492	81.4	70.1	4.80	269	13	156	438
1941	58.5	6.7	65.2	89.7	13,016	18,669	181	93.1	70.0	5.41	326	37	168	531
1942	62.3	8.3	70.6	88.3	13,303	16,295	1,327	100.8	70.0	6.03	389	48	187	624
1943	63.8	7.9	71.7	88.9	14,253	17,666	528	102.5	70.0	6.64	436	52	194	682
1944	67.0	7.0	74.0	90.6	14,580	16,318	180	105.3	70.3	7.13	492	49	201	742
1945	62.1	5.2	67.3	92.3	14,510	12,179	335	95.7	70.4	7.56	483	38	184	705
1946	53.9	4.6	58.5	92.2	14,494	12,864	824	83.5	70.0	8.32	462	37	166	665
1947	66.8	6.7	73.5	90.9	14,728	13,443	572	105.0	69.9	10.57	727	66	240	1,033
1948	68.3	6.6	74.9	91.2	15,139	14,078	350	107.6	69.6	12.40	869	80	292	1,241
1949	60.2	3.4	63.6	94.6	15,104	13,662	562	91.4	69.6	13.24	816	44	258	1,118
1950	66.9	5.8	72.7	92.0	14,982	17,708	706	94.9	69.9	13.43	918	78	293	1,289
1951	72.0	7.3	79.3	90.7	15,319	20,458	1,446	113.7	69.8	14.11	1,037	102	349	1,488
1952	63.9	4.4	68.3	93.5	15,608	17,551	1,075	97.8	69.8	14.45	944	61	314	1,319
1953	73.6	5.2	78.8	93.3	15,989	15,092	779	113.1	69.7	14.67	1,103	76	376	1,555
1954	59.1	.6	59.7	99.0	15,891	12,216	490	85.6	69.7	15.91	961	8	324	1,293
1955	73.6	1.7	75.3	97.7	16,039	10,104	261	107.7	69.9	16.23	1,224	23	388	1,635
1956	72.0	2.5	74.5	96.7	15,923	9,549	631	106.3	70.1	17.58	1,301	35	383	1,719
1957	73.9	2.1	76.0	97.2	15,897	9,519	611	108.4	70.1	18.21	1,382	31	405	1,818
1958	53.0	.6	53.6	98.9	16,244	8,682	149	76.8	69.8	18.19	991	9	300	1,300
1959	54.8	1.1	55.9	98.1	15,993	7,448	118	79.6	70.2	17.76	1,002	16	288	1,306
1960	56.2	1.0	57.2	98.2	15,323	7,583	372	81.4	70.3	18.31	1,060	15	303	1,378

[1] Value of coke-oven products beginning in 1916 revised. Coke breeze previously included with coal-chemical materials (byproducts) now included with oven and beehive coke. Value of tar up to and including 1917 represents that of tar obtained and sold, not always including value of tar used by producers. Beginning with 1918, tar used by producers, except tar distilled, is specifically included. Value of pitch used by producers is included beginning with 1929. Value of surplus gas used by producers is included. For all other coal-chemical materials, only value of those sold is included.

[2] No accurate data on value of coal-chemical materials available.

SCOPE OF REPORT

This chapter on high-temperature oven and beehive coke and related products continues through 1960 the annual statistical series of the coke industry begun by the Federal Geological Survey in 1882 and taken over by the Federal Bureau of Mines in 1925. All data, except where otherwise noted, were voluntarily supplied to the Bureau of Mines by coke-producing companies, operating in the United States. Only products made in high-temperature slot-type and beehive-coke ovens are included, and products made by other carbonization processes (coal-gas retorts, low-temperature carbonization of coal, and carbonization of residues from refining coal tar and petroleum) are specifically excluded. Before 1958, a table of the salient statistics on low- and medium-temperature carbonization plants in the United States was included. These data, although collected by the Bureau of Mines, cannot be published for 1960 because less than three companies were operating commercially. Production of petroleum coke (including catalyst coke) totaled 12 million tons in 1960, and output of coal-tar-pitch coke, as published by the U.S. Tariff Commission, totaled 28,000 short tons.

In 1960, the Bureau of Mines canvassed 75 oven-coke plants and 1 light-oil plant, which refined light oil produced at affiliated coke plants. Of the oven-coke plants canvassed, 70 were active all year, 3 were idle all year, and 2 were active part of the year (1 was closed permanently). In the beehive branch of the coke industry, questionnaires were mailed to 34 companies, owning 44 plants. Returns showed that only 10 plants operated the entire year, 11 plants were active part of the year, and 23 plants were idle the entire year.

The terms "merchant" and "furnace" plants in this chapter apply only to oven-coke plants. Furnace plants are those that are owned by or financially affiliated with iron and steel companies whose main business is producing coke for use in their own blast furnaces. All other coke plants, classified as merchant, include those that manufacture metallurgical, industrial, and residential-heating grades of coke for sale on the open market; those associated with chemical companies or gas utilities; and those affiliated with local iron works, where only a small part (less than 50 percent of output) is used in affiliated blast furnaces

The Bureau of Mines does not attempt to collect data on the manufacturing costs of coke and coal chemicals. The average values for coal that are shown in this report are based on the market values assigned by the coke-producing companies to all coal delivered to the plants whether obtained from captive mines or purchased from commercial mines. The average values at plants of oven and beehive coke produced (including coke consumed by producing companies and coke sold) are based on reports from producing companies that showed receipts, f.o.b. plant, for commercial sales of coke and the prevailing market values assigned by the producer for coke consumed by the producing companies. The average values for the coal chemicals are based on the total realization, f.o.b. plant, for commercial sales of the various commodities.

As used in this chapter, coke refers only to large sizes (usually one-half inch plus), from which smaller sizes (known as breeze) have been screened. Metallurgical coke refers to grades used for smelting and casting ferrous metals in blast furnaces and foundries. The standard unit of measurement in the coke industry is the net or short ton of 2,000 pounds, which is used throughout this chapter.

OVEN AND BEEHIVE COKE AND BREEZE

MONTHLY PRODUCTION

TABLE 6.—Production of oven and beehive coke in the United States [1]

(Short tons)

Month	1947–49 (average)		1958		1959		1960	
	Total	Daily average	Total	Daily average	Total	Daily average	Total	Daily average
Oven coke:								
January	5,875,300	189,500	4,721,500	152,300	5,555,200	179,200	6,203,700	200,100
February	5,393,400	192,600	4,046,700	144,500	5,458,200	195,000	5,936,000	204,700
March	5,775,800	186,300	4,309,000	139,000	6,285,500	202,700	6,261,600	202,000
April	5,231,600	174,400	3,809,200	127,000	6,096,600	203,200	5,672,200	189,100
May	5,707,400	184,100	3,870,800	124,900	6,266,900	202,200	5,290,600	170,700
June	5,409,700	180,300	3,897,700	129,900	5,945,500	198,200	4,558,000	152,000
July	5,355,900	172,800	3,935,400	126,900	3,498,100	112,900	3,987,100	128,600
August	5,564,400	179,500	4,283,700	138,200	1,788,800	57,700	3,935,900	127,000
September	5,394,700	179,800	4,458,100	148,600	1,738,900	58,000	3,604,500	120,100
October	4,519,000	145,800	5,053,300	163,000	1,800,700	58,100	3,891,400	125,600
November	5,003,500	166,800	5,183,200	172,800	4,284,000	142,800	3,496,100	116,600
December	5,857,800	189,000	5,437,100	175,400	6,070,900	195,800	3,382,000	109,100
Total	65,088,500	178,300	53,005,700	145,200	54,789,300	150,100	56,219,100	153,600
Beehive coke:								
January	623,500	20,100	49,400	1,600	80,600	2,600	121,000	3,900
February	574,900	20,600	38,800	1,400	90,000	3,200	132,100	4,500
March	461,900	14,900	41,300	1,300	139,000	4,500	139,600	4,500
April	445,000	14,800	35,700	1,200	159,500	5,300	104,400	3,500
May	582,300	18,800	37,900	1,200	136,200	4,400	80,900	2,600
June	432,500	14,400	46,200	1,600	120,300	4,000	60,500	2,000
July	304,500	9,800	30,400	1,000	66,100	2,100	52,700	1,700
August	425,000	13,700	40,800	1,300	49,900	1,600	78,100	2,500
September	413,500	13,800	56,700	1,900	36,300	1,200	62,300	2,100
October	428,800	13,800	64,700	2,100	37,900	1,200	56,600	1,800
November	411,700	13,700	72,400	2,400	66,100	2,200	60,900	2,100
December	456,300	14,700	84,100	2,700	92,400	3,000	60,500	1,900
Total	5,559,900	15,300	598,400	1,700	1,074,300	3,000	1,009,600	2,800
Total:								
January	6,498,800	209,600	4,770,900	153,900	5,635,800	181,800	6,324,700	204,000
February	5,968,300	213,200	4,085,500	145,900	5,548,200	198,200	6,068,100	209,200
March	6,237,700	201,200	4,350,300	140,300	6,424,500	207,200	6,401,200	206,500
April	5,676,600	189,200	3,844,900	128,200	6,256,100	208,500	5,776,600	192,600
May	6,289,700	202,900	3,908,700	126,100	6,403,100	206,600	5,371,500	173,300
June	5,842,200	194,700	3,943,900	131,500	6,065,800	202,200	4,618,500	154,000
July	5,660,400	182,600	3,965,800	127,900	3,564,200	115,000	4,039,800	130,300
August	5,989,400	193,200	4,324,500	139,500	1,838,700	59,300	4,014,000	129,500
September	5,808,200	193,600	4,514,800	150,500	1,775,200	59,200	3,666,800	122,200
October	4,947,800	159,600	5,118,000	165,100	1,838,600	59,300	3,948,000	127,400
November	5,415,200	180,500	5,255,600	175,200	4,350,100	145,000	3,557,000	118,700
December	6,314,100	203,700	5,521,200	178,100	6,163,300	198,800	3,442,500	111,000
Total	70,648,400	193,600	53,604,100	146,900	55,863,600	153,100	57,228,700	156,400

[1] Daily average calculated by dividing monthly production by number of days in month.

PRODUCTION BY MERCHANT AND FURNACE PLANTS

Tables 7 and 8 show oven coke production in 1960 and several previous years of merchant (nonfurnace) and furnace plant output. The criteria used by the Bureau of Mines in classifying the plants into the two categories are given in the scope of this report. This series, which was started in 1913, is maintained so that all who are interested in coal carbonization in the United States can follow coke production trends of the two principal producing groups.

In 1960, production of coke at merchant plants decreased 7 percent; output at furnace plants which produced 89 percent of the total output of oven coke, rose 4 percent. Figure 2 illustrates the trend in oven-coke production, showing the proportions of oven coke produced by furnace and merchant plants for the past 30 years. Output for nonfurnace or merchant plants, reaching the peak during the mid-thirties, amounted to approximately one-third of the total. Just before World War II or in the late 1930's, natural gas and fuel oil started to replace coke-oven gas and "domestic" coke as a fuel for residential and commercial space heating. World War II temporarily slowed the shift to natural gas and fuel oil, and nonfurnace or merchant plants produced 25 percent of the coke output, and production averaged about 12½ million tons per year. The termination of the war, however, resulted in the lifting of controls on metals for pipeline construction, and new natural gas lines were extended to virtually all sections of the country, particularly along the Eastern Seaboard, which had been a prime market for domestic coke and coke-oven gas. The loss of these markets forced a number of merchant coke plants to discontinue coking operations, and by 1950 less than 20 percent was produced by this group. Coke production at merchant plants continued to decline in the 1950's, and the 1960

TABLE 7.—Production of oven coke in the United States, by type of plant

(Short tons)

Month	1947-49 (average)		1959		1960	
	Merchant plants	Furnace plants	Merchant plants	Furnace plants	Merchant plants	Furnace plants
Production:						
January	1,174,700	4,700,600	670,800	4,884,400	649,400	5,554,300
February	1,070,100	4,323,300	616,400	4,841,800	618,500	5,317,500
March	1,157,800	4,618,000	648,600	5,636,900	654,600	5,607,000
April	1,043,000	4,188,600	595,100	5,501,500	616,500	5,055,700
May	1,129,300	4,578,100	592,400	5,674,500	534,800	4,755,800
June	1,080,700	4,329,000	562,700	5,382,800	497,200	4,060,800
July	1,082,100	4,273,800	534,600	2,963,500	465,700	3,521,400
August	1,097,700	4,466,700	519,400	1,269,400	466,600	3,469,300
September	1,072,800	4,321,900	492,500	1,246,400	443,900	3,160,600
October	1,047,400	3,471,600	465,700	1,335,000	497,200	3,394,200
November	1,026,000	3,977,500	523,300	3,760,700	455,800	3,040,300
December	1,132,800	4,725,000	628,300	5,442,600	464,300	2,917,700
Total	13,114,400	51,974,100	6,849,800	47,939,500	6,364,500	49,854,600
Daily average:						
January	37,900	151,600	21,600	157,600	20,900	179,200
February	38,200	154,400	22,000	173,000	21,300	183,400
March	37,300	149,000	20,900	181,800	21,100	180,900
April	34,800	139,600	19,800	183,400	20,600	168,500
May	36,400	147,700	19,100	183,100	17,300	153,400
June	36,000	144,300	18,800	179,400	16,600	135,400
July	34,900	137,900	17,300	95,600	15,000	113,600
August	35,400	144,100	16,800	40,900	15,100	111,900
September	35,700	144,100	16,400	41,600	14,800	105,300
October	33,800	112,000	15,000	43,100	16,100	109,500
November	34,200	132,600	17,400	125,400	15,200	101,400
December	36,600	152,400	20,200	175,600	15,000	94,100
Average for year	35,900	142,400	18,800	131,300	17,400	136,200

TABLE 8.—Production of oven coke and number of plants in the United States, by type of plant

Year	Number of active plants [1]		Coke produced (short tons)		Percent of production	
	Merchant plants	Furnace plants	Merchant plants	Furnace plants	Merchant plants	Furnace plants
1929	41	46	12,187,439	41,224,387	22.8	77.2
1939	39	45	11,070,506	31,811,807	25.8	74.2
1947–49 (average)	[2] 31	[2] 55	13,114,373	51,974,089	20.1	79.9
1956	23	57	9,575,194	62,417,048	13.3	86.7
1957	22	57	8,685,795	65,174,897	11.8	88.2
1958	22	55	6,543,218	46,462,512	12.3	87.7
1959	21	54	6,849,786	47,939,490	12.5	87.5
1960	19	53	6,364,540	49,854,568	11.3	88.7

[1] Includes plants operating any part of year.
[2] Dec. 31, 1949

total output was the lowest since 1922, amounting to 6,364,540 short tons.

Another merchant coke plant closed in 1960 with the permanent retirement on April 29 of the ovens at Everett, Mass., by the Eastern Gas and Fuel Associates.

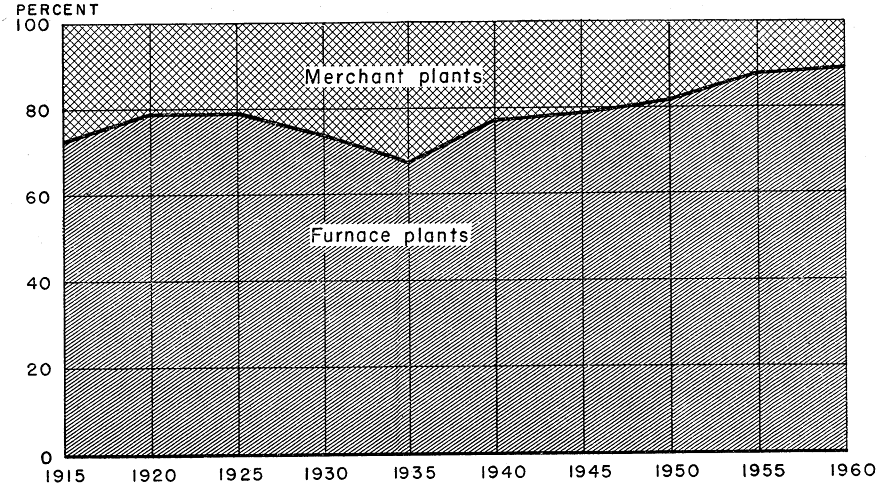

FIGURE 2.—Production of oven coke in the United States, by types of plants.

PRODUCTION BY STATES

Coke was produced in 22 States in 1960; 16 States east of the Mississippi River produced 93 percent of the United States total. Only 6 of the 22 States, exclusive of Alaska and Hawaii, west of Mississippi had active coke plants, and the combined output in these States was less than for Alabama. Approximately one-fourth of the total United States output of coke was produced in Pennsylvania, where production increased 2 percent over 1959. Despite a decrease of 5 percent, or ½ million tons, Ohio retained second place in coke production; Indiana ranked third; together they produced 29 percent of the Nation's total. Indiana had the largest increase of any of the States, gaining more than a million tons, or 16 percent. Other large producing States were Alabama, Michigan, and New York. When compared with 1959, production of coke increased in 12 States in 1960 and decreased in 10. Production of oven and beehive coke by States, is shown in table 9.

TABLE 9.—Production of coke in the United States, by States

(Short tons)

State	1947–49 (average)	1957	1958	1959	1960
Oven coke:					
Alabama	5,682,198	5,919,434	4,256,616	4,897,884	4,897,286
California, Colorado, and Utah	2,155,788	3,214,807	2,578,585	2,311,248	2,840,131
Connecticut, Maryland, Massachusetts, New Jersey, and New York	[1] 10,684,806	9,383,540	7,315,528	6,766,495	7,071,167
Illinois	3,558,768	2,918,015	1,910,835	2,044,977	1,971,107
Indiana	8,301,067	9,754,559	7,797,352	6,892,972	8,024,273
Kentucky, Missouri, Tennessee, and Texas	1,633,073	2,326,074	1,993,046	1,973,124	1,972,816
Michigan	2,717,650	3,707,430	2,526,202	3,265,252	3,278,739
Minnesota and Wisconsin	1,441,918	1,316,595	894,731	963,590	836,072
Ohio	9,847,621	11,299,353	6,474,405	8,840,750	8,423,246
Pennsylvania	15,964,464	20,082,883	13,968,893	13,755,846	14,146,269
West Virginia	3,101,109	3,938,002	3,289,537	3,077,138	2,758,002
Total	65,088,462	73,860,692	53,005,730	54,789,276	56,219,108
Beehive coke:					
Colorado	7,163				
Pennsylvania	4,848,550	1,617,466	355,458	713,150	684,250
Kentucky, Utah, Virginia, and West Virginia	704,227	472,563	242,914	[2] 361,146	[3] 325,360
Total	5,559,940	2,090,029	598,372	1,074,296	1,009,610
Grand total	70,648,402	75,950,721	53,604,102	55,863,572	57,228,718

[1] Includes Rhode Island.
[2] Excludes Utah.
[3] Excludes Kentucky and Utah.

COKE BREEZE

Coke breeze, as mentioned in the scope of this report, consists of the small pieces of coke, ranging in size from 0 to ½ inch or possibly ¾ inch, that are obtained by screening run-of-oven coke. In 1960, the yield of breeze recovered at oven-coke plants ranged from 1.59 to 10.15 percent of the coal carbonized, averaging 4.65 percent. All oven-coke plants are equipped to screen their coke, but there is no established screen size, and sizes vary in accordance with local conditions. Unlike oven-coke plants, few of the beehive-coke plants have screening facilities and most of the breeze is hauled to nearby waste piles or "ash dumps". Except during periods of fuel shortages, this material is not recovered and remains in these dumps. Screening equipment for recovering breeze, which has accumulated over the years when beehive production was high, was installed at many of the breeze "ash dumps" during World War II and nearly one million tons per year of beehive-coke breeze was recovered. There were several of these operations active in 1960, but accurate statistical data on the amount recovered are not available. Data on beehive-coke breeze included in the accompanying tables cover material recovered from the screening of beehive coke produced in 1960.

TABLE 10.—Breeze recovered at coke plants in the United States in 1960, by States

State	Yield per ton of coal (percent)[1]	Produced: Short tons	Produced: Value	Used by producers— In steam plants: Short tons	In steam plants: Value	In agglomerating plants: Short tons	In agglomerating plants: Value	For other industrial uses: Short tons	For other industrial uses: Value	Sold: Short tons	Sold: Value	On hand Dec. 31 (short tons)
Oven coke:												
Alabama	5.26	353,586	$3,509,027	(2)	(2)	37,952	$442,443	27,849	$288,532	171,306	$1,585,685	83,455
California, Colorado, and Utah	6.37	287,022	2,190,553	-----	-----	219,115	1,520,305	21,023	138,347	39,355	463,596	30,249
Connecticut, Maryland, Massachusetts, New Jersey, and New York	5.11	506,952	3,461,522	454,977	$3,041,658	(2)	(2)	48,386	307,341	35,546	381,721	79,181
Illinois	5.59	160,647	892,573	43,968	213,710	35,945	183,056	19,674	135,020	33,662	264,838	45,843
Indiana	5.21	581,506	5,789,939	38,300	439,746	549,309	5,757,467	82,055	838,304	(2)	(2)	793,325
Kentucky, Missouri, Tennessee, and Texas	5.64	154,934	1,176,016	-----	-----	(2)	(2)	(2)	(2)	90,515	902,232	10,858
Michigan	4.58	203,441	1,784,969	(2)	(2)	(2)	(2)	(2)	(2)	75,937	681,513	25,394
Minnesota and Wisconsin	5.36	63,698	434,991	(2)	(2)	-----	-----	(2)	(2)	41,041	329,473	38,361
Ohio	4.28	501,947	3,711,804	60,719	298,154	126,299	896,994	76,796	475,405	289,028	2,310,003	91,699
Pennsylvania	3.54	722,824	3,502,468	446,149	2,150,462	68,948	400,494	135,459	451,492	94,966	586,267	267,789
West Virginia	4.18	168,889	982,343	(2)	(2)	(2)	(2)	24,025	139,702	(2)	(2)	6,283
Undistributed	-----	-----	-----	98,617	797,738	305,947	1,954,698	44,473	335,554	64,885	448,550	-----
Total 1960	4.65	3,705,446	27,436,205	1,142,730	6,941,468	1,343,515	11,155,457	479,740	3,109,697	936,241	7,953,878	[3]1,472,437
At merchant plants	5.81	517,208	4,565,693	192,907	1,401,193	-----	-----	8,855	57,543	331,145	3,238,944	72,727
At furnace plants	4.50	3,188,238	22,870,512	949,823	5,540,275	1,343,515	11,155,457	470,885	3,052,154	605,096	4,714,934	1,399,710
Total 1959	4.78	3,710,968	25,549,658	1,209,412	7,180,876	982,799	7,424,811	458,003	2,705,896	899,956	7,211,782	[3]1,660,174
Beehive coke:												
Pennsylvania	6.13	30,482	61,901	-----	-----	-----	-----	-----	-----	28,500	58,706	1,982
Virginia and West Virginia	2.53	7,187	25,585	-----	-----	-----	-----	-----	-----	7,499	26,535	410
Total 1960	4.82	37,669	87,486	-----	-----	-----	-----	-----	-----	35,999	85,241	2,392
Total 1959	6.23	74,217	155,529	-----	-----	-----	-----	-----	-----	85,508	173,474	722

[1] Computed by dividing production by coal carbonized at plants actually recovering breeze.
[2] Included with "Undistributed" to avoid disclosing individual company figures.
[3] Includes some breeze resulting from the screening of coke at blast furnaces.

The utilization of breeze has changed substantially in the past decade (table 11). Until the 1950's most breeze produced at oven-coke plants was used by producers as boiler fuel for generating electric power. Producers continue to use most of their output; in 1960 they used more in agglomerating plants adjacent to the ovens than they did for power generation. In the years, 1947–49, producers used 63 percent of their output in powerplants and 14 percent for all other uses, including agglomerating. In 1960, they used only 31 percent in powerplants, 36 in agglomerating plants, and 13 for lining soaking pits, lining pig-iron runners, and other purposes. The quantity of breeze shown in table 11 as consumed in agglomerating plants was not the total breeze consumption for this purpose, as it did not include coke breeze recovered from rescreening blast-furnace coke at blast furnaces nor breeze used at agglomerating plants not affiliated with coke plants. In order to obtain data on the total quantity of carbonaceous material used in agglomerating plants, the Division of Minerals began collecting this information in 1957. Preliminary data for 1960 indicate that more than 2 million tons of coke breeze was used to sinter iron ore at iron and steel plants.

Another steadily increasing use of coke breeze is in manufacturing elemental phosphorus. Although exact data are lacking, breeze consumed in the smelting of phosphate rock in 1960 was estimated at about 600,000 tons. A substantial proportion of the phosphate-furnace capacity is in the far Western States, where there is a shortage of breeze, and these furnaces have had to obtain coke from distant sources. A new pilot plant to produce coke briquets for use in phosphate furnaces was under construction in 1960.[4]

The increased demand for breeze caused the average 1960 selling price to be double the 1947–49 average (table 11).

TABLE 11.—Oven- and beehive-coke breeze used in the United States or sold, by uses

(Short tons)

Year	Used by producers				Sold	Average value per ton
	In steam plants	In agglomerating plants	For making producer or water gas	For other industrial uses		
1947-49 (average)	3,450,905	[1] 300,000	77,795	411,260	1,142,589	$3.79
1956	2,423,147	591,686		443,549	1,196,939	6.19
1957	2,113,472	637,956		528,514	1,227,197	6.90
1958	1,514,757	768,415		354,997	914,263	7.35
1959	1,209,412	982,799		458,003	985,464	7.49
1960	1,142,730	1,343,515		479,740	972,240	8.27

[1] Estimated.

NUMBER AND TYPE OF OVENS

Slot-Type Coke Ovens.—The number of slot-type coke ovens in existence at the end of 1960 was the lowest since December 31, 1951. More ovens were taken out of production in 1960 than in any year on

[4] Coke Plant in Wyoming Food Machinery and Chemical Corp.'s Answer to Long Haul: Oil, Paint, and Drug Reporter, vol. 177, No. 14, Mar. 28, 1960, p. 5.

record, exceeding the previous maximum of 1954 by 86 ovens. However, not all of the ovens closed in 1960 were permanently abandoned, as 671 were demolished either for rebuilding or to be replaced with completely new ovens. There were 282 new ovens completed and placed in operation in 1960 and 372 under construction at year's end. All but 18 of the new ovens under construction were at furnace plants, replacing 56 old ovens dismantled in 1960. In the past 10 years, 1950–60, only 201 new ovens have been built at merchant plants, and 1,236 have been permanently abandoned. At furnace plants, however, 5,831 ovens were completed, and only 4,479 ovens were abandoned. During this period, furnace plants added 1,278 ovens to their total, but a reduction of 937 occurred at merchant plants.

The results of the extensive construction program at furnace plants are clearly shown in table 13. In this table, the age of ovens are shown for the two classes of coke plants in 5-year intervals. Eighty-four percent of all ovens in existence at furnace plants were less than 25 years old. Merchant plants, however, had less than 30 percent of their total under 25 years of age. Economic conditions prevented the modernization and replacement of old ovens at merchant plants since the end of World War II and will be the governing factor in the future, when many of the existing ovens cannot be operated efficiently, and will either have to be retired permanently or rebuilt.

TABLE 12.—Slot-type coke ovens completed and abandoned in the United States in 1960, by States

State	Plants in existence Dec. 31 [1]	Ovens: In existence Dec. 31: Number	Ovens: In existence Dec. 31: Annual coke capacity (short tons)	Ovens: New: Number	Ovens: New: Annual coke capacity (short tons)	Ovens: Abandoned during year [2]	Ovens: Under construction Dec. 31: Number	Ovens: Under construction Dec. 31: Annual coke capacity (short tons)
Alabama	7	1,451	7,084,900	----	----	37	65	400,000
California	1	315	1,450,000	----	----	----	----	----
Colorado	1	206	1,069,000	----	----	31	----	----
Connecticut	1	70	410,000	----	----	----	----	----
Illinois	6	507	2,714,000	----	----	----	61	350,000
Indiana	5	2,191	10,651,600	----	----	----	----	----
Kentucky	1	196	1,170,000	----	----	----	----	----
Maryland	1	760	4,174,000	63	288,000	61	----	----
Massachusetts	----	----	----	----	----	108	----	----
Michigan	4	769	4,340,100	----	----	----	----	----
Minnesota	3	200	856,700	----	----	41	----	----
Missouri	1	40	146,500	----	----	56	18	66,000
New Jersey	1	230	1,105,000	----	----	----	----	----
New York	3	845	4,300,000	76	438,000	61	----	----
Ohio	14	2,368	12,307,700	84	476,000	106	----	----
Pennsylvania	14	3,792	19,898,100	59	354,000	400	177	1,062,000
Tennessee	1	44	264,000	----	----	----	----	----
Texas	2	140	832,000	----	----	----	----	----
Utah	2	308	1,434,600	----	----	----	----	----
West Virginia	4	691	4,098,600	----	----	51	51	240,200
Wisconsin	1	200	570,100	----	----	----	----	----
Total 1960	73	15,323	78,876,900	282	1,556,000	952	372	2,118,200
At merchant plants	19	2,025	8,850,500	----	----	224	18	66,000
At furnace plants	54	13,298	70,026,400	282	1,556,000	728	354	2,052,200
Total 1959	74	15,993	81,447,700	101	406,400	352	118	720,000

[1] Excludes plants retired permanently during year.
[2] Includes ovens dismantled for rebuilding.

TABLE 13.—Age of slot-type coke ovens in the United States on Dec. 31, 1960 [1]

Age	At merchant plants		At furnace plants		Total			
	Number	Annual coke capacity (short tons)	Number	Annual coke capacity (short tons)	Number	Percent of total	Annual coke capacity (short tons)	Percent of total
Under 5 years			1,715	9,156,300	1,715	11.2	9,156,300	11.6
From 5 to 10 years	165	863,500	3,439	18,512,800	3,604	23.5	19,376,300	24.6
From 10 to 15 years	57	250,600	2,588	14,279,900	2,645	17.3	14,530,500	18.4
From 15 to 20 years	174	840,600	2,088	11,182,400	2,262	14.8	12,023,000	15.2
From 20 to 25 years	200	1,120,200	1,332	7,503,300	1,532	10.0	8,623,500	10.9
From 25 to 30 years	23	88,300	102	497,100	125	.8	585,400	.8
From 30 to 35 years	357	1,731,200	243	1,266,500	600	3.9	2,997,700	3.8
From 35 to 40 years	105	301,200	158	738,500	263	1.7	1,039,700	1.3
40 years and over	944	3,654,900	1,633	6,889,600	2,577	16.8	10,544,500	13.4
Total	2,025	8,850,500	13,298	70,026,400	15,323	100.0	78,876,900	100.0

[1] Age dates from first entry into operation or from last date of rebuilding.

TABLE 14.—Number of slot-type coke ovens in the United States on December 31, 1960, by States and kinds

State	Koppers	Koppers-Becker	Semet-Solvay	Wilputte	All others	Total
Alabama	301	842	180	65	[1] 63	1,451
California		315				315
Colorado	60	146				206
Connecticut		70				70
Illinois		177		330		507
Indiana	340	1,079	120	652		2,191
Kentucky			120	76		196
Maryland		760				760
Michigan		259	362	148		769
Minnesota	65	115		20		200
Missouri					[2] 40	40
New Jersey	165	65				230
New York	184	237	120	304		845
Ohio	694	801	176	697		2,368
Pennsylvania	791	1,965	88	948		3,792
Tennessee			24	20		44
Texas		140				140
Utah		308				308
West Virginia	154	463		74		691
Wisconsin	100		100			200
Total 1960	2,854	7,742	1,290	3,334	103	15,323
At merchant plants	465	519	624	377	40	2,025
At furnace plants	2,389	7,223	666	2,957	63	13,298
Total 1959	[3] 3,379	[3] 7,901	1,350	3,260	103	15,993

[1] Otto.
[2] Simon-Carves.
[3] Revised figure.

Beehive ovens.—Reversing a trend beginning in 1952, there was an increase of 135 beehive ovens in 1960 over the preceding year. The construction of two new coke plants—one to supply coke to a chemical plant and one, to a blast-furnace operation—more than offset the ovens removed from the Bureau of Mines list. For many years or since shortly after World War I, the number of serviceable beehive ovens has fluctuated with the demand for blast-furnace coke. In the past several years, however, a number of factors have contributed to the small number of beehive ovens in operation. The most important reasons for this reduced activity at beehive plants were the low operating rates of blast furnaces beginning in

1958 and to the tremendous decline in coke rates in blast furnaces in the past 5 years. Because of these developments, demand for beehive coke by blast furnaces was small, and many plants with operable beehive ovens were idle. As shown in table 16, the largest number of ovens in production occurred in March, when an average of 2,810 were active. In the last 6 months only about 1,800 out of 5,684 operable ovens were active.

TABLE 15.—Beehive-coke ovens completed and abandoned in the United States in 1960, by States

State	Plants in existence Dec. 31	Ovens: In existence Dec. 31		In operating condition Dec. 31		Not in operating condition Dec. 31		New or rebuilt	Abandoned during year	Under construction Dec. 31
		Number	Annual coke capacity (short tons)	Number	Annual coke capacity (short tons)	Number	Annual coke capacity (short tons)			
Kentucky	1	200	150,000	200	150,000	-------	-------	200	193	-------
Pennsylvania	33	6,208	3,833,900	4,669	2,956,200	1,539	877,700	647	519	-------
Virginia	5	663	375,000	611	347,900	52	27,100	-------	-------	-------
West Virginia	4	512	257,000	204	101,600	308	155,400	-------	-------	-------
Total 1960	43	7,583	4,615,900	5,684	3,555,700	1,899	1,060,200	847	[1] 712	-------
Total 1959	45	7,448	4,368,800	5,148	3,131,600	2,300	1,237,200	191	[1] 1,425	153

[1] Idle and not expected to resume production; removed from list of available ovens.

TABLE 16.—Average number of beehive-coke ovens active in the United States in 1960, by months

Month	Number	Month	Number	Month	Number
January	2,560	May	2,046	September	1,825
February	2,594	June	1,719	October	1,628
March	2,810	July	1,748	November	1,718
April	2,733	August	1,865	December	1,721

CAPACITY OF OVEN-COKE PLANTS

The potential maximum annual coke capacity of oven-coke plants decreased 2.6 million tons during 1960—the largest decrease in capacity in 20 years. This decline was caused in part by the permanent closing of the Everett, Mass., coke plant by the Eastern Gas and Fuel Associates and also by the dismantling of a large number of ovens by the iron and steel industry, most of which will be rebuilt or replaced with new ovens. Table 17 shows the capacity of merchant and furnace plants in 1960 and a few previous years for comparison. As shown in this table, annual coke capacity at furnace plants increased 18 percent since 1949, but capacity at merchant plants dropped 38 percent.

The potential annual coke capacity reported to the Bureau of Mines by coke producers is based on the minimum coking time necessary to produce coke with the qualities suitable for its intended use. Therefore, the potential capacity of a plant may change from year to year, depending on the age and condition of the ovens, the character and quality of coal carbonized, the grade of coke required, and other factors. For example, annual coke capacity of a coke plant that primarily made foundry coke with longer coking cycles would be lower than one that produced blast-furnace coke. Also some ovens must be operated at slightly lower flue temperatures then normal because of the conditions of the refractories, and potential capacity would naturally be somewhat lower than designed capacity. For this reason, the capacity reported to the Bureau of Mines may differ from the designed or rated capacity estimated by the coke-oven builders at the time of construction. For example, if the generally accepted standard coking rate of 1 inch per hour were used to calculate the capacity of slot-type coke ovens on December 31, 1960, the capacity would have been 80.4 million tons or 2 percent higher than the potential capacity reported to the Bureau of Mines. The maximum coke capacity shown in table 17, however, is believed to be a reliable measure of the practical operating capacity of the industry.

Table 18 shows the operating rate of slot-type coke ovens in 1960 and several previous years. As shown in this table the operating rates of the ovens began to decline in the last quarter of 1957. It remained low throughout 1958, increased in the first half of 1959, but dropped to an abnormally low rate in July because of the steel

TABLE 17.—Potential maximum annual coke capacity of oven-coke plants in existence in the United States

Year	At merchant plants				At furnace plants				Total			
	In existence Dec. 31		Annual coke capacity (short tons)	Change from 1949 (percent)	In existence Dec. 31		Annual coke capacity (short tons)	Change from 1949 (percent)	In existence Dec. 31		Annual coke capacity (short tons)	Change from 1949 (percent)
	Plants	Ovens			Plants	Ovens			Plants	Ovens		
1949	30	3,057	14,209,200	--------	55	12,047	59,500,900	--------	85	15,104	73,710,100	------
1956	22	2,424	11,009,600	−22.5	57	13,499	68,955,500	+15.9	79	15,923	79,965,100	+8.5
1957	22	2,420	11,061,400	−22.2	56	13,477	69,238,000	+16.4	78	15,897	80,299,400	+8.9
1958	22	2,420	11,030,800	−22.4	55	13,824	71,467,100	+20.1	77	16,244	82,497,900	+11.9
1959	20	2,249	10,393,800	−26.9	54	13,744	71,053,900	+19.4	74	15,993	81,447,700	+10.5
1960	19	2,025	8,850,500	−37.7	54	13,298	70,026,400	+17.7	73	15,323	78,876,900	+7.0

TABLE 18.—Monthly operating rates [1] of oven-coke plants in the United States

(Percent)

Month	1956	1957	1958	1959	1960	Month	1956	1957	1958	1959	1960
January	97.5	95.3	68.5	80.6	88.7	August	81.2	92.6	61.6	25.7	57.5
February	97.5	95.3	65.0	87.7	90.7	September	96.2	92.5	66.3	25.8	54.4
March	97.0	95.7	62.5	91.2	89.5	October	96.9	89.5	72.7	25.8	56.8
April	96.5	92.7	57.1	91.4	83.8	November	96.6	83.1	77.1	63.3	52.8
May	94.7	93.1	56.1	91.0	75.6	December	97.8	74.0	78.3	86.8	49.5
June	91.9	92.5	57.9	87.8	68.8						
July	33.3	92.5	56.6	50.0	58.2	Average	89.7	92.0	64.3	67.3	71.2

[1] Capacity of all ovens in existence, whether active or idle, based upon maximum daily capacity multiplied by days in month.

strike. It rose in December of 1959 and remained normal through the first quarter of 1960. It began to decline in April and continued to drop to a low figure for the year in December.

QUANTITY AND VALUE OF COAL CARBONIZED

Coke ovens carbonized approximately 1,834,558 tons or 2 percent more coal in 1960 than in 1959, but the total quantity carbonized was 25 percent below the record of 1957. The gain in quantity of coal carbonized was due to the 3-percent gain in slot-type ovens; the quantity charged into beehive ovens decreased 10 percent. Usually, the quantity of coal carbonized each month is uniform because coke is used mainly as an industrial fuel and coke-oven operations are not subjected to seasonal variations. The slackening in operating rates of slot-type and beehive-coke ovens, beginning about midyear, continued through the last 6 months, and affected coal consumption drastically. In the first 6 months of 1960, the average daily consumption of coal in slot-type ovens was 264,208 tons, which if continued in the last half of the year, would have totaled more than 96 million tons for the year. However, the slackening in industrial activity, particularly in the iron and steel industry, reduced coke demand, and coal consumption decreased steadily from July through the rest of the year. In the last half of 1960, the quantity of coal charged into coke ovens was 34 percent less then the amount carbonized in the first half. Tables 19 and 20 show the quantities of bituminous coal and anthracite carbonized each month in 1960 compared with the total in 1959 and the average for the years, 1947–49.

The value of coal delivered to coke plants increased $0.02 in 1960. The average value per short ton of coal delivered to both oven- and beehive-coke plants increased $0.01 per ton.

TABLE 19.—Bituminous coal carbonized in coke ovens in the United States, by months

(Short tons)

Month	1947–49 (average)			1959			1960		
	Slot type	Beehive	Total	Slot type	Beehive	Total	Slot type	Beehive	Total
January	8,320,100	987,400	9,307,500	7,865,600	138,700	8,004,300	8,706,800	196,700	8,903,500
February	7,647,600	906,500	8,554,100	7,719,900	154,200	7,874,100	8,385,500	212,100	8,597,600
March	8,195,000	726,000	8,921,000	8,859,900	235,100	9,095,000	8,877,700	225,400	9,103,100
April	7,448,200	700,900	8,149,100	8,611,300	267,000	8,878,300	8,011,200	166,300	8,177,500
May	8,096,100	905,800	9,001,900	8,829,700	222,700	9,052,400	7,469,300	130,400	7,599,700
June	7,697,200	673,900	8,371,100	8,360,700	201,600	8,562,300	6,421,000	98,400	6,519,400
July	7,631,400	482,200	8,113,600	4,931,500	119,600	5,051,100	5,630,400	87,400	5,717,800
August	7,901,400	665,500	8,566,900	2,530,100	88,000	2,618,100	5,545,800	126,500	5,672,300
September	7,617,700	645,000	8,262,700	2,458,200	67,100	2,525,300	5,069,600	101,600	5,171,200
October	6,397,800	669,100	7,066,900	2,534,900	67,200	2,602,100	5,484,500	94,100	5,578,600
November	7,118,300	641,900	7,760,200	6,099,600	111,800	6,211,400	4,945,600	102,100	5,047,700
December	8,326,100	712,700	9,038,800	8,552,700	154,500	8,707,200	4,825,900	100,400	4,926,300
Total	92,396,900	8,716,900	101,113,800	77,354,100	1,827,500	79,181,600	79,373,300	1,641,400	81,014,700

TABLE 20.—Anthracite carbonized at oven-coke plants in the United States, by months

(Short tons)

Month	1947–49 (average)	1957	1958	1959	1960
January	17,600	31,800	29,000	28,400	35,800
February	16,600	30,700	25,700	28,100	37,700
March	19,300	33,100	24,700	31,800	42,200
April	21,500	37,600	20,700	29,000	36,100
May	18,800	38,500	18,900	33,400	32,900
June	19,800	32,100	15,000	30,800	29,700
July	18,200	30,000	15,100	29,400	25,900
August	18,900	30,000	17,300	29,500	26,200
September	20,100	31,400	19,200	28,200	25,500
October	22,000	33,600	22,000	33,700	28,500
November	20,900	31,700	21,900	33,600	25,700
December	16,700	28,800	25,300	32,900	24,100
Total	230,400	389,300	254,800	368,800	370,300

TABLE 21.—Value of coal and products per short ton of coal carbonized in the United States

Year	Oven coke					Beehive coke	
	Value of coal per ton	Value per ton of coal				Value of coal per ton	Value per ton of coal
		Coke produced	Breeze produced	Coal chemical materials used or sold [1]	Total		
1947–49 (average)	$7.79	$8.49	$0.19	$2.85	$11.53	$4.90	$7.22
1956	9.35	12.46	.26	3.75	16.47	5.99	8.62
1957	9.91	12.88	.28	3.86	17.02	6.25	8.98
1958	9.89	12.75	.32	3.96	17.03	5.71	8.27
1959	9.88	12.56	.33	3.71	16.60	6.10	8.61
1960	9.89	12.96	.34	3.85	17.15	6.11	8.99

[1] Includes value of surplus gas used and tar and pitch-of-tar burned.

TABLE 22.—Average value per short ton of coal carbonized at oven-coke plants in the United States, by States

State	1947–49 (average)	1957	1958	1959	1960
Alabama	$6.27	$7.72	$8.21	$8.56	$8.18
California, Colorado, and Utah	7.44	12.06	11.72	13.04	12.56
Connecticut, Maryland, Massachusetts, New Jersey, and New York	[1] 9.13	11.81	12.07	11.72	11.94
Illinois	9.00	10.89	10.39	10.58	10.17
Indiana	8.99	11.12	11.31	11.29	11.43
Kentucky, Missouri, Tennessee, and Texas	8.00	10.65	10.78	10.37	9.93
Michigan	7.98	10.28	10.17	10.18	10.08
Minnesota and Wisconsin	9.18	11.40	11.45	11.54	11.32
Ohio	7.75	9.95	9.80	9.56	9.61
Pennsylvania	6.88	8.77	8.33	8.48	8.45
West Virginia	5.79	7.57	7.79	7.90	7.75
U.S. average	7.79	9.91	9.89	9.88	9.89
Value of coal per ton of coke	11.09	14.08	14.15	14.02	14.03

[1] Includes Rhode Island.

TABLE 23.—Quantity and value at ovens of coal carbonized in the United States in 1960, by States

State	Coal carbonized			Coal per ton of coke	
	Short tons	Value		Short tons	Value
		Total	Average		
Oven coke:					
Alabama	6,718,458	$54,954,677	$8.18	1.37	$11.22
California, Colorado, and Utah	4,504,555	56,573,291	12.56	1.59	19.92
Connecticut, Maryland, Massachusetts, New Jersey, and New York	9,914,668	118,365,143	11.94	1.40	16.74
Illinois	2,874,399	29,218,872	10.17	1.46	14.82
Indiana	11,155,151	127,500,624	11.43	1.39	15.89
Kentucky, Missouri, Tennessee, and Texas	2,749,175	27,299,591	9.93	1.39	13.84
Michigan	4,439,025	44,756,473	10.08	1.35	13.65
Minnesota and Wisconsin	1,188,272	13,453,122	11.32	1.42	16.09
Ohio	11,738,938	112,847,705	9.61	1.39	13.40
Pennsylvania	20,422,815	172,532,525	8.45	1.44	12.20
West Virginia	4,038,073	31,296,780	7.75	1.46	11.35
Total 1960	79,743,529	788,798,803	9.89	1.42	14.03
At merchant plants	8,900,616	93,782,690	10.54	1.40	14.74
At furnace plants	70,842,913	695,016,113	9.81	1.42	13.94
Total 1959	77,722,907	768,075,654	9.88	1.42	14.02
Beehive coke:					
Pennsylvania	1,088,515	6,980,925	6.41	1.59	10.20
Virginia and West Virginia	552,895	3,044,466	5.51	1.70	9.36
Total 1960	1,641,410	10,025,391	6.11	1.63	9.93
Total 1959	1,827,474	11,152,140	6.10	1.70	10.38

PREPARATION AND SOURCE OF COAL

Washed and Unwashed Coal.—Eighty-four percent of the bituminous coal carbonized in slot-type coke ovens in 1960 was washed before charging into the ovens (table 24). Most of the cleaning and washing was done at or near the mines, as only two coke plants had washeries adjacent to the ovens.

There has been a steady increase in the use of cleaned coal at coke ovens, and the proportion carbonized in 1960 was the largest on record (table 25). The substantial increase in washed coal at coke plants in recent years was attributed to a number of factors. Probably the most important reason for cleaning coal is to improve the quality of the coal to provide a means of maintaining a uniform product. Coke quality depends to a greater degree upon the character and quality of the coal than upon oven design and carbonizing techniques. Coke with high ash or sulfur content is undesirable for use in blast furnaces, foundry cupolas, and other industrial operations. Another factor is that the steady increase in the mechanical mining and loading of coal, although increasing productivity and reducing costs, often results in more refuse content in the run-of-mine coal, necessitating extensive cleaning in some areas. All coal that was mined and carbonized in Colorado and Alabama was washed. About two-thirds of the coal from Pennsylvania and West Virginia and substantial tonnages from Kentucky and Virginia was washed.

TABLE 24.—Washed and unwashed coal carbonized in the United States in 1960, by States in which used

(Short tons)

State	Bituminous coal			Anthracite	Grand total
	Washed	Unwashed	Total		
Oven coke:					
Alabama	6,602,091	92,899	6,694,990	23,468	6,718,458
California, Colorado, and Utah	3,713,926	790,629	4,504,555		4,504,555
Connecticut, Maryland, Massachusetts, New Jersey, and New York	5,483,527	4,376,868	9,860,395	54,273	9,914,668
Illinois	2,374,669	489,391	2,864,060	10,339	2,874,399
Indiana	10,688,962	426,669	11,115,631	39,520	11,155,151
Kentucky, Missouri, Tennessee, and Texas	2,427,891	280,815	2,708,706	40,469	2,749,175
Michigan	4,372,808		4,372,808	66,217	4,439,025
Minnesota and Wisconsin	1,031,512	103,074	1,134,586	53,686	1,188,272
Ohio	10,533,286	1,170,129	11,703,415	35,523	11,738,938
Pennsylvania	15,442,985	4,933,063	20,376,048	46,767	20,422,815
West Virginia	4,038,073		4,038,073		4,038,073
Total 1960	66,709,730	12,663,537	79,373,267	370,262	79,743,529
At merchant plants	8,298,728	278,863	8,577,591	323,025	8,900,616
At furnace plant	58,411,002	12,384,674	70,795,676	47,237	70,842,913
Total 1959	64,684,419	12,669,658	77,354,077	368,830	77,722,907
Beehive coke:					
Pennsylvania	830,847	257,668	1,088,515		1,088,515
Virginia and West Virginia	377,934	174,961	552,895		552,895
Total 1960	1,208,781	432,629	1,641,410		1,641,410
Total 1959	1,382,914	444,560	1,827,474		1,827,474

TABLE 25.—Washed and unwashed bituminous coal carbonized in the United States

(Short tons)

Year	Washed coal			Unwashed coal			Total coal carbonized	Percent of total washed
	At coke ovens	At beehive ovens	Total	At coke ovens	At beehive ovens	Total		
1947-49 (average)	29,501,961	1,442,138	30,944,099	62,894,990	7,274,728	70,169,718	101,113,817	30.6
1956	72,090,891	2,462,335	74,553,226	29,780,531	1,626,880	31,407,411	105,960,637	70.4
1957	76,364,204	2,196,977	78,561,181	28,182,427	1,276,161	29,458,588	108,019,769	72.7
1958	57,608,824	709,687	58,318,511	17,952,217	305,729	18,257,946	76,576,457	76.2
1959	64,684,419	1,382,914	66,067,333	12,669,658	444,560	13,114,218	79,181,551	83.4
1960	66,709,730	1,208,781	67,918,511	12,663,537	432,629	13,096,166	81,014,677	83.8

Blending.—Although coal cleaning permits the maintenance of uniformity of quality of an individual coal, blending permits the maintenance of uniformity of the coking-coal admixtures. All oven-coke plants blend their coals before carbonizing. Coal blending has four main objectives: (1) to improve the physical quality and uniformity of the coke; (2) to control the pressure developed in the coke oven by the carbonization process; (3) to control the yield of the products; and (4) to broaden the use of inferior coals for coke manufacture. The usual practice is to blend major proportions of high-volatile coals with minor proportions of low-volatile coal. The addition of low-volatile coal improves the physical structure of the coke and increases the coke yield. However, the quantity of low-volatile coal that can be added is limited, because, beyond a certain proportion, coke quality changes slightly, but the expanding pressure causes damage to oven walls. Virtually all foundry-coke producers use a small percentage of anthracite fines in their coal blends, where large sizes are desired and increased resistance to shatter of the resultant coke is more important than decreased resistance to abrasion. A few plants, which use low rank coal, blend small quantities of hard coal-tar pitch with the coal to improve coke quality; in other plants, a small quantity of oil is added to increase gas yield or to increase the bulk density of the coal charged.

As previously mentioned, most of the plants mix and blend high- and low-volatile coals. In 1960, of the 72 active coke plants, 68 used coals of different volatile content, 37 (including 5 using anthracite) used high- and low-volatile coals; 26 (including 13 using anthracite) used high-, medium-, and low-volatile coal; 3 utilized high- and medium-volatile coal; and 2 used low- and medium-volatile coal and anthracite. Four plants used straight medium-volatile coal.

TABLE 26.—Coal received by coke-oven operators in the United States in 1960, by consuming States and volatile content [1]

(Short tons)

Consuming State	High-volatile		Medium-volatile		Low-volatile		Total coal receipts
	Quantity	Percent of total	Quantity	Percent of total	Quantity	Percent of total	
Alabama	506,149	7.5	5,868,368	87.1	363,435	5.4	6,737,952
California, Colorado, and Utah	3,570,133	79.2	588,372	13.0	350,570	7.8	4,509,075
Connecticut, Maryland, Massachusetts, New Jersey, and New York	6,612,504	65.6	739,744	7.3	2,729,874	27.1	10,082,122
Illinois	2,057,152	74.4	38,438	1.4	670,261	24.2	2,765,851
Indiana	6,591,503	58.5	1,464,089	13.0	3,220,289	28.5	11,275,881
Kentucky, Missouri, Tennessee, and Texas	1,900,591	69.5	171,746	6.3	662,782	24.2	2,735,119
Michigan	2,834,635	63.9	425,586	9.6	1,176,552	26.5	4,436,773
Minnesota and Wisconsin	597,534	57.2	68,319	6.5	378,711	36.3	1,044,564
Ohio	8,587,246	73.4	353,466	3.0	2,754,262	23.6	11,694,974
Pennsylvania	15,860,030	76.5	1,675,754	8.1	3,205,967	15.4	20,741,751
West Virginia	3,422,417	84.4			633,688	15.6	4,056,105
Total 1960	52,539,894	65.6	11,393,882	14.2	16,146,391	20.2	80,080,167
At merchant plants	4,422,555	50.7	1,442,550	16.5	2,861,263	32.8	8,726,368
At furnace plants	48,117,339	67.4	9,951,332	14.0	13,285,128	18.6	71,353,799
Total 1959	49,919,516	64.5	11,792,343	15.2	15,700,067	20.3	77,411,926

[1] Volatile matter on moisture- and ash-free basis: High-volatile—over 31 percent; medium-volatile—22 to 31 percent; and low-volatile—14 to 22 percent.

TABLE 27.—Average volatile content of bituminous coal carbonized at oven-coke plants in the United States

Year	High		Medium		Low		Total	
	Short tons	Volatile content (percent)	Short tons	Volatile content (percent)	Short tons	Volatile content (percent)	Short tons	Volatile content (percent)
1947-49 (average)	60,454,142	34.0	11,484,978	27.9	20,457,830	17.2	92,396,950	29.5
1956	67,361,091	34.9	11,221,853	26.8	23,288,478	17.5	101,871,422	30.0
1957	68,788,430	34.6	12,052,871	26.3	23,705,330	17.5	104,546,631	29.7
1958	51,012,307	34.8	10,271,173	25.7	14,277,561	17.5	75,561,041	30.3
1959	49,698,552	35.3	12,017,265	25.9	15,638,260	17.3	77,354,077	30.2
1960	52,065,009	35.5	11,113,548	25.8	16,194,710	17.5	79,373,267	30.4

Sources.—The largest reserves of coking coal in the United States are in the Appalachian Region, extending from Alabama northeastward to Pennsylvania. States in this region supplied 93 percent of the coal carbonized in the United States in 1960. In addition, about three-fourths of the coal carbonized in Canada in 1960 and a substantial tonnage shipped to various countries in Europe, South America, and Asia originated in this region. High-, medium-, and low-volatile coals are mined in this region; West Virginia and Pennsylvania together supplied 68 percent of the high-volatile coal, 27 percent of the medium-volatile coal, and 93 percent of the low-volatile coal. Low-volatile coals are important to the coke industry because they improve the physical properties of metallurgical coke, particularly its strength. Coal deposits in the eastern region, comprising Illinois, Indiana, and Western Kentucky, are large, but most of the deposits contain coal, which makes a weak coke. The Illinois Geological Survey has conducted numerous studies of the coking properties of Illinois coal, substantial tonnages of which are used in manufacturing metallurgical coke in the Chicago area. Most of the coking coal used

TABLE 28.—Origin of coal received by coke-oven operators in the United States in 1960, by producing fields and volatile content

(Short tons)

State and field [1] where coal was produced	Volatile content [2]			Total
	High	Medium	Low	
Alabama	593,117	5,691,991		6,285,108
Arkansas			127,303	127,303
Colorado	1,038,973	461,563		1,500,536
Illinois	637,350			637,350
Kentucky:				
Elkhorn	5,516,440			5,516,440
Harlan	4,671,559			4,671,559
Kenova-Thacker	12,994			12,994
New Mexico	190,871			190,871
Oklahoma	416,435	215,939	310,308	942,682
Pennsylvania:				
Anthracite			360,867	360,867
Bituminous:				
Central Pennsylvania	184	320,979	2,466,479	2,787,642
Connellsville	5,389,434			5,389,434
Freeport	2,667,670			2,667,670
Pittsburgh	11,190,103			11,190,103
Somerset		7,127	179,714	186,841
Westmoreland	252,327			252,327
Tennessee		203,351		203,351
Utah	2,340,289			2,340,289
Virginia:				
Buchanan	70,424	786,029		856,453
Clinch Valley		147,830		147,830
Pocahontas		770,478	281,006	1,051,484
Southwestern	1,401,863	68,065		1,469,928
West Virginia:				
Coal River	325,826			325,826
Coal and coke	24,365			24,365
Fairmont	5,462,442			5,462,442
Kanawha	5,642,014	53,872		5,695,886
Kenova-Thacker	1,129,690			1,129,690
Logan	2,238,249	10,722		2,248,971
New River	175,280		313,937	489,217
Pocahontas		630,869	9,297,092	9,927,961
Randolph-Barbour	263,493	62,111		325,604
Tug River			131,200	131,200
Webster-Gauley	888,502	1,093,875		1,982,377
Winding Gulf		850,512	2,678,485	3,528,997
Canada		18,569		18,569
Total	52,539,894	11,393,882	16,146,391	80,080,167

[1] As defined by the U.S. Coal Commission of 1922.
[2] Volatile matter on moisture- and ash-free basis: High-volatile—over 31 percent; medium-volatile—22 to 31 percent; and low-volatile—14 to 22 percent.

in the Chicago area must be transported long distances by rail and water to reach the plants, and replacing any of the Eastern coals with Illinois coals cuts coal costs to the coke-plant operators involved.

Coking-coal deposits are found west of the Mississippi River but they are much smaller than those of the Appalachian region. In 1960, coking coal was obtained from the southwestern part of Colorado and northern New Mexico, the Sunnyside beds in the Castle Gate field of Utah, Haskell and other counties of eastern Oklahoma, and Sebastian County in Western Arkansas. The Oklahoma-Arkansas deposits are the only commercially developed source of low-volatile coal in the West. A small amount of coal was imported from Canada and carbonized in Utah. Table 28 shows the origin of coking coal obtained by coke-plant operators in 1960. Table 29 shows the origin and destination of coking coal delivered to oven-coke plants in the United States.

TABLE 29.—Origin and destination of coal delivered to oven-coke plants in the United States in 1960, by States

(Short tons)

Consuming State	Coal produced in—						
	Alabama	Arkansas	Colorado	Illinois	Kentucky	New Mexico	Oklahoma
Alabama	6,198,085						
California, Colorado, and Utah		127,303	1,500,536			190,871	277,095
Connecticut, Maryland, Massachusetts, New Jersey, and New York					908,705		
Illinois				501,362	1,237,475		
Indiana				133,546	5,405,588		
Kentucky, Missouri, Tennessee, and Texas	87,023			2,442			665,587
Michigan					1,135,759		
Minnesota and Wisconsin					249,419		
Ohio					983,136		
Pennsylvania					280,911		
West Virginia							
Total 1960	6,285,108	127,303	1,500,536	637,350	10,200,993	190,871	942,682
At merchant plants	660,263				35,038		
At furnace plants	5,624,845	127,303	1,500,536	637,350	10,165,955	190,871	942,682
Total 1959	5,912,034	224,277	1,266,922	657,493	8,842,558	53,936	1,010,940

Consuming State	Coal produced in—						
	Pennsylvania	Tennessee	Utah	Virginia	West Virginia	Canada	Total
Alabama	21,929	140,784		55	377,099		6,737,952
California, Colorado, and Utah			2,340,289		54,412	18,569	4,509,075
Connecticut, Maryland, Massachusetts, New Jersey, and New York	3,290,941			416,168	5,466,308		10,082,122
Illinois	10,843			69,899	946,272		2,765,851
Indiana	38,243			773,722	4,924,782		11,275,881
Kentucky, Missouri, Tennessee, and Texas	43,340	62,567		173,974	1,700,186		2,735,119
Michigan	349,231			391,631	2,560,152		4,436,773
Minnesota and Wisconsin	53,714			7,389	734,042		1,044,564
Ohio	3,977,229			831,327	5,903,282		11,694,974
Pennsylvania	12,093,709			861,530	7,505,601		20,741,751
West Virginia	2,955,705				1,100,400		4,056,105
Total 1960	22,834,884	203,351	2,340,289	3,525,695	31,272,536	18,569	80,080,167
At merchant plants	311,816			476,093	7,243,158		8,726,368
At furnace plants	22,523,068	203,351	2,340,289	3,049,602	24,029,378	18,569	71,353,799
Total 1959	21,224,188	258,786	2,161,394	4,330,263	31,439,764	29,371	77,411,926

Captive coal.—Sixty-one percent of the coal carbonized in slot-type coke ovens in 1960 was produced in mines owned and operated by the coke-producing companies. These mines normally do not produce coal for sale on the commercial market, but mine coals for use in their own coke ovens; such coal is referred to in this report as "captive". The coke industry uses more captive coal than any other industry. By owning their coal mines, the coke-oven operators can maintain better control of quality and be assured of an adequate supply during periods of heavy demand. This is particularly true of the iron and steel companies, and the use of captive coal at furnace plants has increased markedly during the past decade. In 1960, furnace plants obtained 63 percent of their coal requirements from captive mines. Nonfurnace or merchant plants obtained 44 percent, a gain of 52 percent over the 1947–49 average. Table 30 shows the captive coal obtained by merchant and furnace plants in 1960 and several previous years.

TABLE 30.—Quantity and percentage of captive coal received by coke-oven operators in the United States

(Short tons)

Year	At merchant plants			At furnace plants			Total		
	Total coal received	Captive coal		Total coal received	Captive coal		Total coal received	Captive coal	
		Quantity	Percent		Quantity	Percent		Quantity	Percent
1947–49 (average)	18,321,004	5,286,361	28.9	76,138,301	48,371,093	63.5	94,459,305	53,657,454	56.8
1956	13,407,253	5,740,551	42.8	90,740,999	59,378,485	65.4	104,148,252	65,119,036	62.5
1957	12,092,303	5,250,574	43.4	95,427,661	61,543,355	64.5	107,519,964	66,793,929	62.1
1958	8,985,366	3,839,880	48.1	66,873,620	44,605,122	66.7	75,858,986	48,445,002	63.9
1959	9,732,587	4,479,701	46.0	67,679,339	40,675,316	60.1	77,411,926	45,155,017	58.3
1960	8,726,368	3,834,264	43.9	71,353,799	45,091,010	63.2	80,080,167	48,925,274	61.1

CONSUMPTION OF COKE

The apparent consumption of coke in the United States in 1960, based on production, imports, exports, and change in producers' stocks, increased 4 percent over 1959 but was 18 percent below the average for the years 1947–49. Some significant developments have occurred in the past decade concerning coke consumption. As shown in table 31, approximately 20 percent of the apparent consumption at the beginning of the 1950's was used for other than blast-furnace use. At that time approximately 3 million tons of coke per year was used to manufacture water gas, and over 2 million tons was used for commercial and residential heating and cooking. These markets in 1960 were but a small fraction of their sizes at the beginning of the 1950's. Probably the most important development, however, was the rapid decline in the coke rate in smelting iron ore in blast furnaces. Because this end use for coke required over 90 percent of the total coke production, changes in coke rates are important. In 1960, the amount of coke consumed per ton of pig iron and ferroalloys produced in blast furnaces dropped to 1,516 pounds. This was a decrease of 4 percent below 1959 and 21 percent below 1947–49. Figure 3 shows the downward trend in the coke rate. Continued decreases can be expected in coke rates through further treatment or enrichment of iron ore, supplemental fuel injection in blast furnaces, and other improved blast-furnace operating techniques.

Tables 33 and 34 summarize, by major end uses, the disposal of oven and beehive coke in 1960. A large proportion of the oven coke, particularly at furnace plants, is used by producers in integrated blast furnaces, whereas, nearly all of the beehive coke is shipped to other consumers. In 1960, furnace plants used 96 percent of their output mainly for smelting iron ore in blast furnaces and sold the remainder for miscellaneous industrial purposes. Merchant plants used only a small proportion of their output and supplied most of the coke used in iron foundries, nonferrous smelters, and chemical-process plants. In 1960, 57 percent of the coke produced at merchant plants was shipped to iron blast furnaces, 32 percent to iron foundries, 1 percent to gas plants, 13 percent to other industrial plants, and 6 percent to homeowners and retailers for residential and commercial heating. Historically, beehive coke has been used mainly as a blast-furnace fuel for smelting iron ore. In 1960, 62 percent of the beehive coke produced was used and sold to blast-furnace plants, compared with 87 percent in 1951. This percentage is likely to decrease more because two new beehive plants were built in 1959–60 to supply chemical plants. When these plants go into full production, shipments classified as "other industrial" should increase sharply.

TABLE 31.—Apparent consumption of coke in the United States

(Short tons)

Year	Total production	Imports	Exports	Net change in stocks	Apparent U.S consumption [1]	Consumption: In iron furnaces [2]		Consumption: All other purposes	
						Quantity	Percent	Quantity	Percent
1947–49 (average)	70,648,402	181,000	696.699	+280,230	69,852,473	55,877,463	80.0	13,975,010	20.0
1956	74,482,526	130,955	655,717	+633,670	73,324,094	65,289,270	89.0	8,034,824	11.0
1957	75,950,721	117,951	822,244	+814,335	74,432,093	67,580,507	90.8	6,851,586	9.2
1958	53,604,102	121,517	392,817	+674,588	52,658,214	46,598,980	88.5	6,059,234	11.5
1959	55,863,572	123,255	460,222	+859,072	54,667,533	48,241,686	88.2	6,425,847	11.8
1960	57,228,718	125,160	353,016	+55,652	56,945,210	51,044,206	89.6	5,901,004	10.4

[1] Production plus imports minus exports, plus or minus net changes in stocks.
[2] American Iron and Steel Institute; figures include coke consumed in manufacturing ferroalloys.

TABLE 32.—Coke and coking coal consumed per short ton of pig iron and ferroalloys produced in the United States

Year	Coke per short ton of pig iron and ferro-alloys [1] (pounds)	Yield of coke from coal (percent)	Coking coal per short ton of pig iron and ferro-alloys (pounds calculated)	Year	Coke per short ton of pig iron and ferro-alloys [1] (pounds)	Yield of coke from coal (percent)	Coking coal per short ton of pig iron and ferro-alloys (pounds calculated)
1913	2,172.6	66.9	3,247.5	1947–49 (average)	1,919.7	69.7	2,754.2
1918	2,120.7	66.4	3,193.8	1958	1,613.4	69.8	2,311.5
1929	1,838.0	69.0	2,663.8	1959	[2] 1,586.2	70.2	[2] 2,259.5
1939	1,778.0	69.8	2,547.3	1960	1,516.4	70.3	2,157.0

[1] American Iron and Steel Institute; consumption per ton of pig iron only, excluding furnaces making ferroalloys, was 2,172.6 in 1913, 2,120.7 in 1918, 1,813.3 in 1929, 1,760.0 in 1939, 1,892.8 in 1947–49 (average), 1,597.9 in 1958, 1,569.0 in 1959, and 1,497.4 in 1960.
[2] Revised figure.

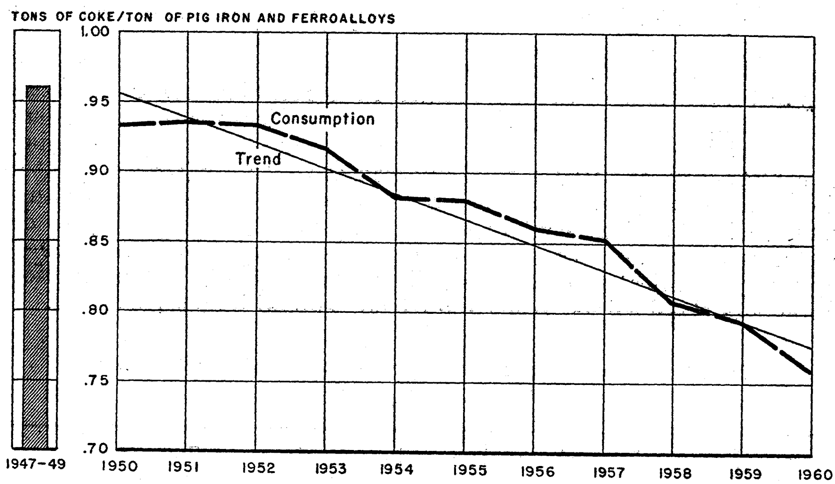

FIGURE 3.—Coke consumption per ton of pig iron and ferroalloys produced in blast furnaces.

TABLE 33.—Oven coke produced in the United States, used by producers, and sold in 1960, by States

State	Produced		Used by producing companies— In blast furnaces		Used by producing companies— For other purposes [1]		Commercial sales To blast-furnace plants	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	4,897,286	$99,558,578	3,692,473	$72,647,676	66,195	$1,730,535	(2)	(2)
California, Colorado, and Utah	2,840,131	71,450,903	2,693,761	67,733,990	7,179	152,429		
Connecticut, Maryland, Massachusetts, New Jersey, and New York	7,071,167	119,710,542	5,562,096	91,488,228	110,009	1,858,661	1,054,259	$16,998,899
Illinois	1,971,107	37,108,601	1,844,471	33,975,685	86,321	2,746,500		
Indiana	8,024,273	156,066,508	7,219,230	139,076,677	10,866	175,307	(2)	(2)
Kentucky, Missouri, Tennessee, and Texas	1,972,816	37,266,880	689,136	14,187,795	(2)	(2)	(2)	(2)
Michigan	3,278,739	59,657,982	(2)	(2)	219,048	4,668,522	(2)	(2)
Minnesota and Wisconsin	836,072	19,734,512	(2)	(2)	574	9,011		
Ohio	8,423,246	142,066,358	7,092,022	117,771,269	292,277	5,669,619	(2)	(2)
Pennsylvania	14,146,269	242,467,506	13,451,4[illegible]8	229,002,013	72,457	1,172,073	406,988	6,667,310
West Virginia	2,758,002	48,079,487	2,702,210	47,282,241	(2)	(2)	(2)	(2)
Undistributed			2,782,588	46,705,073	8,022	233,411	2,024,302	31,485,766
Total 1960	56,219,108	1,033,167,857	47,729,475	859,870,647	872,948	18,416,068	3,485,549	55,151,975
At merchant plants	6,364,540	134,553,708			422,988	8,898,496	3,081,960	48,493,601
At furnace plants	49,854,568	898,614,149	47,729,475	859,870,647	449,960	9,517,572	403,589	6,658,374
Total 1959	54,789,276	976,343,886	45,836,378	793,254,313	890,857	18,983,176	2,783,159	44,300,754

See footnotes at end of table.

TABLE 33.—Oven coke produced in the United States, used by producers, and sold in 1960, by States—Continued

State	Commercial sales—Continued							
	To foundries		To other industrial plants[3]		For residential heating		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	450, 343	$13, 138, 187	243, 878	$3, 721, 087	(2)	(2)	954, 225	$21, 000, 739
California, Colorado, and Utah	(2)	(2)	(2)	(2)	----------	----------	(2)	(2)
Connecticut, Maryland, Massachusetts, New Jersey, and New York	244, 876	7, 156, 315	261, 723	4, 409, 514	257, 091	$4, 729, 307	1, 817, 949	33, 294, 035
Illinois	----------	----------	24, 145	310, 136	4, 249	67, 678	28, 394	377, 814
Indiana	(2)	(2)	81, 341	1, 518, 579	34, 110	521, 821	496, 961	12, 781, 755
Kentucky, Missouri, Tennessee, and Texas	(2)	(2)	116, 955	2, 223, 669	(2)	(2)	1, 308, 810	23, 159, 845
Michigan	(2)	(2)	200, 908	3, 406, 382	(2)	(2)	645, 976	15, 468, 050
Minnesota and Wisconsin	(2)	(2)	80, 190	1, 565, 993	(2)	(2)	413, 446	11, 586, 007
Ohio	219, 984	6, 618, 336	207, 536	3, 067, 160	(2)	(2)	997, 800	18, 537, 401
Pennsylvania	174, 545	5, 478, 822	164, 726	2, 162, 457	30, 705	457, 602	776, 964	14, 766, 191
West Virginia	----------	----------	(2)	(2)	----------	----------	(2)	(2)
Undistributed	1, 132, 794	34, 935, 025	43, 248	795, 950	70, 772	1, 068, 711	89, 143	1, 532, 869
Total 1960	2, 222, 542	67, 326, 685	1, 424, 650	23, 180, 927	396, 927	6, 845. 119	7, 529, 668	152, 504, 706
At merchant plants	2, 038, 313	61, 611, 197	844, 531	15, 202, 502	384, 491	6, 680, 028	6, 349, 295	131, 987, 328
At furnace plants	184, 229	5, 715, 488	580, 119	7, 978, 425	12, 436	165, 091	1, 180, 373	20, 517, 378
Total 1959	2, 455, 484	74, 478, 101	1, 509, 318	23, 883, 365	472, 458	8, 137, 880	7, 220, 419	150, 800, 100

[1] Comprises 199,251 tons valued at $6,370,141 used in foundries; 76,343 tons, $1,332,926 to make producer and water gas; and 597,354 tons, $10,713,001 for other purposes.
[2] Included with "Undistributed" to avoid disclosing individual company figures.
[3] Includes 32,820 tons valued at $596,609 to water-gas plants.

TABLE 34.—Beehive coke produced in the United States, used by producers, and sold in 1960, by States

State	Produced		Used by producing companies—				Commercial sales	
			In blast furnaces		For other purposes		To blast-furnace plants	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Pennsylvania	684,250	$9,704,321	31,395	(1)	--------	--------	473,601	$7,061,425
Virginia and West Virginia	325,360	5,048,242	--------	--------	--------	--------	117,852	1,824,983
Total 1960	1,009,610	14,752,563	31,395	(1)	--------	--------	591,453	8,886,408
Total 1959	1,074,296	15,740,926	47,430	$812,020	--------	--------	750,247	11,351,079

State	Commercial sales—Continued							
	To foundries		To other industrial plants		For residential heating		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Pennsylvania	1,867	$31,634	182,578	$2,165,418	202	$1,952	658,248	$9,260,429
Virginia and West Virginia	5,025	76,979	201,992	3,137,643	249	4,536	325,118	5,044,141
Total 1960	6,892	108,613	384,570	5,303,061	451	6,488	983,366	14,304,570
Total 1959	8,396	135,985	267,991	3,442,985	1,030	15,042	1,027,664	14,945,091

[1] Concealed to avoid disclosing individual company figures.

DISTRIBUTION OF OVEN AND BEEHIVE COKE

Table 35 shows the quantity of coke distributed in each State according to major end-uses in 1960. Total distribution of coke, exclusive of imports, was slightly higher than in 1959. This increase was due largely to the 2.4-million-ton gain in shipments to blast-furnace plants. Shipments to "other industrial" plants increased slightly, but shipments to all other consuming groups shown in the accompanying table were smaller than in 1959. The largest increase in coke distribution occurred in Pennsylvania, the perennial leader in coke production. The gain of approximately 1.2 million tons in coke distribution in this State resulted mainly from increased shipments to blast-furnace plants. Distribution in Ohio, which ranked second in coke consumption, declined because of a drop in shipments to blast furnaces. Other States where distribution advanced more than 250,000 tons in 1960 were Indiana, Maryland, and Michigan.

Blast-furnace coke was consumed in approximately 82 plants in 17 States. Most blast-furnace coke was produced within the State where it was consumed. Blast furnaces and coke ovens are usually integrated and the entire coke output moves by conveyer belt or interplant railroad to the adjacent blast furnaces. Unlike blast-furnace coke, coke shipments to foundries and other industrial plants are widespread and move from coast to coast. The average iron foundry requires much less coke than an average blast-furnace installation, but they are more numerous and number well over 2,000,

TABLE 35.—Distribution of oven and beehive coke and breeze in 1960 [1]

(Short tons)

Consuming State	Coke						Breeze
	To blast-furnace plants	To foundries	To producer- and water-gas plants	To other industrial plants	For residential heating	Total	
Alabama	3,518,908	172,485		62,031	13,131	3,766,555	195,455
Arizona		565				565	62
Arkansas		993		1,051		2,044	81
California	959,165	52,762		37,570		1,049,497	78,999
Colorado	500,704	12,947		24,399		538,050	61,859
Connecticut		25,532	52,889	1,411	31,779	111,611	35,816
Delaware		293		1,418	145	1,856	1,840
District of Columbia		33				33	
Florida		4,530		9,501	290	14,321	50,592
Georgia		11,199		1,830	4,627	17,656	989
Idaho		151		69,441		69,592	32,068
Illinois	4,043,845	215,767		54,601	16,367	4,330,580	177,101
Indiana	5,727,973	123,825	522	59,028	29,106	5,940,454	677,332
Iowa		46,528		1,579	1,290	49,397	1,241
Kansas		8,663		97		8,760	11
Kentucky	577,805	30,045		152,152	8,395	768,397	41,265
Louisiana		2,145		52,772	158	55,075	470
Maine		1,476	17,433		4,879	23,788	
Maryland	3,005,331	20,428		14,850		3,040,609	191,916
Massachusetts		43,477		11,966	81,597	137,040	16,449
Michigan	3,296,674	535,328		239,861	5,239	4,077,102	250,327
Minnesota	394,046	21,421		19,577	1,926	436,970	21,431
Mississippi		929		74		1,003	206
Missouri		27,478		30,800		58,278	591
Montana		1,714		16,204	37	17,955	23,583
Nebraska		2,784		7,811		10,595	15,305
Nevada		38		8,240		8,278	62
New Hampshire		3,245			3,318	6,563	
New Jersey		70,868	30,923	64,432	98,153	264,376	90,825
New Mexico		232		385	90	707	239
New York	3,297,235	94,177		95,956	30,326	3,517,694	239,655
North Carolina		19,437		15,799	1,634	36,870	16,880
North Dakota		250		271		521	
Ohio	8,986,035	309,168		459,715	7,879	9,762,797	464,818
Oklahoma		4,939		418		5,357	5,784
Oregon		5,475		15,224		20,699	4,689
Pennsylvania	14,022,710	145,102	7,396	369,315	28,750	14,573,273	719,793
Rhode Island		11,128			4,826	15,954	
South Carolina		8,701		18,709	320	27,730	3,288
South Dakota		570		634		1,204	
Tennessee	99,197	65,910		124,065	1,322	290,494	166,654
Texas	625,758	53,399		59,885	1,252	740,294	71,403
Utah	1,233,892	16,859		22,366		1,273,117	106,197
Vermont		2,361			1,322	3,683	
Virginia	92,373	45,477		42,182	403	180,435	750
Washington		2,392		3,792		6,184	4,006
West Virginia	1,428,850	7,700		19,200	6	1,455,756	154,080
Wisconsin		119,626		5,331	16,323	141,280	8,134
Wyoming		26		3,408		3,434	211
Total	51,810,501	2,350,578	109,163	2,199,351	394,890	56,864,483	3,932,457
Exported	27,371	78,107		174,403	2,488	282,369	5,768
Grand total	51,837,872	2,428,685	109,163	2,373,754	397,378	57,146,852	3,938,225

[1] Based upon reports from producers showing destination and principal end use of coke used or sold. Does not include imported coke, which totaled 125,160 tons in 1960.

scattered in virtually every State. The largest concentration of foundries, however, is in cities such as Detroit, Flint, Chicago, Cleveland, Lorain, Birmingham, Pittsburgh, Buffalo, and Milwaukee. These foundries are responsible for the large tonnage of coke consumed in the States where these cities are located. Michigan alone consumed more than one-fifth of the total foundry-coke consumption of the United States. Coke shipments to other industrial plants were also widespread moving to all but 5 States and the District of Columbia exclusive of Hawaii and Alaska. Coke under this classification has numerous industrial uses such as in chemical processing, nonferrous smelting, and rock-wool manufacture. Distribution to gas plants was small, and shipments to retail dealers and residential heating trade were less than 1 percent of the total coke disposal.

Coke screenings or breeze was consumed in all but 6 States and the District of Columbia, exclusive of Alaska and Hawaii; the largest quantity was consumed in the producing States. This small-sized coke, which was used principally as a boiler fuel for many years, was in strong demand in 1960, particularly by producers of elemental phosphorus and operators of agglomerating plants.

STOCKS OF COKE AND COKING COAL

Coke.—Generally when industrial activity slackens, producers' stocks of coke increase. This axiom held true in 1960 as producers' stocks increased 1 percent. The gain in coke inventories was the result of reduced blast-furnace operating rates, which caused stocks at oven-coke furnace plants to rise nearly one-half million tons because stocks at merchant oven-coke plants decreased 24 percent. Table 37 shows stocks of oven coke at producing plants, by types of plants and by months, for 1959–60. Stocks were high at the beginning of the year when they were equal to 21 days' production at capacity operations. They decreased during the first quarter and dropped more than a million tons. Beginning in April, they started to increase and at yearend were slightly higher than at the beginning. Table 36 shows stocks of oven and beehive coke according to grade. Eighty-six percent of the stocks of oven coke at producers' plants was blast-furnace coke. Furnace plants are operated primarily to produce blast-furnace coke, and over 98 percent of coke stocks at such plants was blast-furnace coke. Stocks of coke at merchant plants comprised 55 percent blast-furnace coke, 13 percent foundry coke, and 32 percent all other grades.

Coking coal.—Stocks of bituminous coal at oven-coke plants decreased 4 percent during 1960, and at yearend, based on capacity operations, the supply was sufficient for 35 days. Stocks of bituminous coal ranged from a low of 10,342,992 short tons at the end of July to a high of 12,391,359 short tons at the end of June. The drop in coal stocks at the end of July was caused largely by the vacation period of the coal miners (the first 2 weeks of July), cutting shipments to coke plants. Coking-coal stocks are of the highest importance in the coke industry because of the continuous nature of the carbonization process. A 30-day supply has been generally recognized by coke-plant operators as the absolute minimum necessary to prevent any disruption in oven operations when the coal supply is shut off because of some emergency (transportation, strikes, or other reasons). However, as shown in table 38, the quantity of stock in the past 5 years was lowest during the steel strike in the summer of 1959 when furnace oven-coke plants were unable to receive coal. Stocks of coal never got below a 32-day supply based on normal operating rates. Stocks of anthracite at oven-coke plants, by months, for the 1956–60 period are shown in table 39. Anthracite which is used mostly at plants producing foundry coke, is only a small fraction of the coal admixture.

TABLE 36.—Producers' stocks of coke and breeze in the United States on December 31, 1960, by States

(Short tons)

State	Coke				Breeze
	Blast furnace	Foundry	Residential heating and other	Total	
Oven coke:					
Alabama	841,129	8,427	48,250	897,806	83,455
California, Colorado, and Utah	328,752			328,752	30,249
Connecticut, Maryland, Massachusetts, New Jersey, and New York	595,309	50,148	271,664	917,121	79,181
Illinois	118,945		2,250	121,195	45,843
Indiana	606,473	4,548	4,058	615,079	793,325
Kentucky, Missouri, Tennessee, and Texas	75,819	41,843	11,901	129,563	10,858
Michigan	106,359	2,722	37,891	146,972	25,394
Minnesota and Wisconsin	89,892	50,065	45,646	185,603	38,361
Ohio	483,799	23,204	28,492	535,495	91,699
Pennsylvania	794,324	5,024	4,233	803,581	267,789
West Virginia	51,190			51,190	6,283
Total 1960	4,091,991	185,981	454,385	4,732,357	1,472,437
At merchant plants	696,218	172,643	411,138	1,279,999	72,727
At furnace plants	3,395,773	13,338	43,247	3,452,358	1,399,710
Total 1959	3,782,111	153,457	736,634	4,672,202	1,660,174
Beehive coke:					
Pennsylvania	4,604		53	4,657	1,982
Virginia and West Virginia	151		923	1,074	410
Total 1960	4,755		976	5,731	2,392
Total 1959	9,633		601	10,234	722

TABLE 37.—Producers' month-end stocks of oven coke in the United States[1]

(Short tons)

Month	At merchant plants		At furnace plants		Total	
	1959	1960	1959	1960	1959	1960
January	1,426,953	1,509,752	2,365,714	2,693,321	3,792,667	4,203,073
February	1,434,710	1,335,244	2,301,668	2,528,636	3,736,378	3,863,880
March	1,429,303	1,169,297	2,217,662	2,489,886	3,646,965	3,659,183
April	1,381,255	1,142,022	2,131,101	2,591,367	3,512,356	3,733,389
May	1,319,564	1,108,945	1,953,885	2,652,030	3,273,449	3,760,975
June	1,257,204	1,080,945	1,792,285	2,786,014	3,049,489	3,866,959
July	1,335,556	1,111,927	1,983,614	2,937,947	3,319,170	4,049,874
August	1,514,743	1,149,724	2,429,114	3,095,476	3,943,857	4,245,200
September	1,652,464	1,171,635	2,835,838	3,254,113	4,488,302	4,425,748
October	1,728,528	1,192,112	3,256,891	3,410,894	4,985,419	4,603,006
November	1,760,116	1,212,300	3,397,869	3,468,534	5,157,985	4,680,834
December	1,685,663	1,279,999	2,986,539	3,452,358	4,672,202	4,732,357

[1] Includes blast-furnace, foundry, and residential heating coke.

TABLE 38.—Month-end stocks of bituminous coal at oven-coke plants in the United States

(Short tons)

Month	1956	1957	1958	1959	1960
January	12,561,742	12,796,209	13,217,378	12,123,513	11,428,017
February	12,341,898	12,801,976	12,096,279	11,801,729	11,241,870
March	12,839,544	13,254,278	11,906,462	11,684,172	11,148,141
April	12,865,107	13,285,465	11,781,534	11,569,096	11,324,365
May	13,605,645	13,895,620	11,585,237	11,837,123	11,916,169
June	14,004,567	13,978,054	11,787,762	12,424,398	12,391,359
July	13,060,538	11,717,007	10,039,582	9,566,108	10,342,992
August	13,366,033	12,503,701	10,118,979	9,394,516	10,742,409
September	13,521,835	13,006,022	10,523,274	9,261,161	10,918,346
October	14,005,637	13,935,303	11,666,111	9,375,872	11,082,639
November	14,093,446	14,002,603	12,335,715	10,127,812	11,203,784
December	13,893,561	14,092,205	12,939,358	11,495,611	11,028,816

TABLE 39.—Month-end stocks of anthracite at oven-coke plants in the United States

(Short tons)

Month	1956	1957	1958	1959	1960
January	57,683	129,330	118,859	87,314	77,724
February	41,748	127,418	101,751	71,101	65,831
March	29,469	119,472	89,855	49,463	50,517
April	30,301	114,369	82,121	61,706	55,222
May	40,024	110,412	81,514	73,204	67,100
June	52,716	125,664	82,716	84,874	71,499
July	59,886	111,649	73,007	74,957	68,800
August	95,156	134,686	91,358	95,529	86,143
September	85,754	147,258	97,399	96,480	89,366
October	113,610	145,879	112,265	106,230	108,090
November	138,879	145,051	113,980	117,243	107,542
December	146,581	138,085	103,599	108,893	92,848

ASSIGNED VALUE AND PRICE

The procedure that establishes the average value of coke produced in the United States is explained in the scope of this report. The combined average value of oven and beehive coke production increased $0.55 per ton or 3 percent over the 1959 data. This increase was caused by the $0.56-per-ton rise in oven coke as the average value of beehive coke decreased $0.04 per ton. The average value of production includes an assigned value by the producers on the coke used and the market value on coke sold. A more accurate measure for determining trends in prices is the average price or receipts per ton of coke sold. In table 40, data for 1960 showed that the average receipts per ton for oven coke sold in 1960 dropped $0.64 per ton; beehive coke went up $0.01 per ton.

Table 41 shows the average receipts per ton of coke sold by uses. The average prices on blast-furnace and foundry oven coke declined, and those for other industrial and residential heating coke increased. For beehive coke, the average price of coke sold to other industrial plants increased; average receipts per ton for blast furnace, foundry, and residential heating coke declined.

TABLE 40.—Average value per short ton of coke produced in the United States and average receipts per short ton from coke sold (commercial sales)

Year	Value per ton produced [1]			Receipts per ton sold		
	Oven coke	Beehive coke	Total	Oven coke	Beehive coke	Total
1947-49 (average)	$12.08	$11.32	$12.02	$13.87	$11.95	$13.41
1956	17.70	14.16	17.58	18.39	14.11	17.64
1957	18.31	14.92	18.21	19.51	14.90	18.71
1958	18.24	14.03	18.19	19.87	14.03	19.35
1959	17.82	14.65	17.76	20.89	14.54	20.09
1960	18.38	14.61	18.31	20.25	14.55	19.59

[1] Beginning in 1954, figures are based on market values; therefore, they are not comparable with values shown for preceding years.

TABLE 41.—Average receipts per short ton of coke sold (commercial sales), by uses

Year	Oven coke				Beehive coke			
	To blast-furnace plants	To foundries	To other industrial plants [1]	For residential heating	To blast-furnace plants	To foundries	To other industrial plants [1]	For residential heating
1947-49 (average)	$13.02	$17.61	$12.70	$12.49	$11.59	$13.93	$12.46	$10.98
1956	15.70	26.50	14.35	16.30	14.02	16.58	14.31	12.41
1957	16.08	28.77	15.74	17.12	14.63	17.03	15.75	10.68
1958	15.37	28.93	16.09	17.14	14.89	16.46	12.86	11.23
1959	15.92	30.33	15.82	17.22	15.13	16.20	12.85	14.60
1960	15.82	30.29	16.27	17.25	15.02	15.76	13.79	14.39

[1] Includes water-gas plants.

TABLE 42.—Average monthly prices per short ton of furnace and foundry beehive coke and foundry oven coke in the United States in 1960 [1]

	January-December		January-December
Beehive coke, at ovens:		Oven foundry coke—Continued	
Connellsville furnace	$14.75-15.25	Kearny	$31.25
Connellsville foundry	18.00-18.50	Milwaukee	32.00
Oven foundry coke, at ovens:		Painesville	32.00
Birmingham	30.35	Philadelphia	31.00
Detroit	32.00	St. Louis	33.00
Everett [2]	33.55	St. Paul	31.25
Indianapolis	31.25	Swedeland	31.00

[1] As quoted by STEEL magazine.
[2] New England delivered or within $5.15 freight zone from works.

FOREIGN TRADE [5]

Imports.—Coke imports are small when compared with national production, amounting to less than 1 percent of the apparent consumption of the United States. In the past 5 years, coke imports have averaged about 124,000 short tons per year, which was the amount imported in 1960. All but 440 short tons was imported from Canada most of which was imported through the Montana-Idaho, Michigan, and Washington customs districts (table 43). Although

[5] 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.

the tonnage entering the United States from Canada was small, it was important in certain areas particularly in the northwestern part of the United States where there are no American coke plants to supply local requirements. The average value of imports was $11.85 per ton, which was considerably lower than the average value of coke exported from the United States.

TABLE 43.—Coke imported for consumption in the United States, by countries and customs districts

	1958		1959		1960	
	Short tons	Value	Short tons	Value	Short tons	Value
COUNTRY						
North America:						
Canada	121,474	$1,570,121	123,145	$1,437,937	124,720	$1,470,241
Mexico	43	618				
Total	121,517	1,570,739	123,145	1,437,937	124,720	1,470,241
Europe:						
Belgium-Luxembourg					440	12,863
Netherlands			110	3,325		
Total			110	3,325	440	12,863
Grand total	121,517	1,570,739	123,255	1,441,262	125,160	1,483,104
CUSTOMS DISTRICT						
Buffalo	12,351	184,828	14,433	158,825	302	2,557
Dakota	1,652	20,394	207	1,784		
Duluth and Superior	126	1,356				
Hawaii			110	3,325	440	12,863
Laredo	43	618				
Maine and New Hampshire	66	1,152	126	2,209	102	1,995
Michigan	32,494	304,642	47,895	406,817	53,356	448,892
Montana and Idaho	58,611	841,217	52,950	769,924	58,452	856,709
Rochester	112	1,497				
St. Lawrence					75	2,543
Vermont	123	2,168	127	2,033	66	1,190
Washington	15,939	212,867	7,407	96,345	12,367	156,355
Total	121,517	1,570,739	123,255	1,441,262	125,160	1,483,104

Source: Bureau of the Census.

Exports.—Exports of coke, including breeze, decreased 23 percent in quantity and 21 percent in value below 1959. The decline in coke exports was caused largely by the 20-percent drop in shipments to Canada. Exports to South America in 1960 were only about one-sixth as large as the 1959 total, but the total shipments to all South America were only 2 percent of the Canadian total. Normally, Canada receives about four-fifths of all coke exported from the United States; the 1960 figure amounted to 85 percent. Exports to all other countries were small; the largest tonnage (23,584 tons) went to Cuba.

The Bureau of the Census does not publish any data showing the grades or sizes of coke exported from the United States. According to coke producers who reported exports to the Bureau of Mines, approximately 28 percent of coke exported by the producing companies was foundry grade. This coke usually sells for a higher price than all other coke and affects the average value of coke exported. There has also been a tremendous drop in the quantity of coke exported to

Canada for residential heating. Before World War II, and even during the War, about 50 percent of the coke shipped to Canada was sized coke for space heating. In 1960, only 1 percent was estimated to have been shipped for this purpose, and the remainder, or 99 percent, was for various industrial purposes. Table 44 shows in detail the quantities and values of coke exported to foreign countries by continental groups.

TABLE 44.—Coke exported from the United States, by countries and customs districts

	1958		1959		1960	
	Short tons	Value	Short tons	Value	Short tons	Value
COUNTRY						
North America:						
Canada	302,301	$5,147,752	379,466	$6,967,478	301,704	$5,707,215
Mexico	4,005	140,934	4,648	171,967	9,757	251,784
Panama	203	10,470	150	10,371	128	9,345
West Indies:						
Cuba	22,501	512,944	26,383	538,553	23,584	515,210
Trinidad and Tobago	97	2,348	220	4,783		
Other West Indies	197	9,420	136	8,994	140	3,949
Other North America	260	13,861	30	1,405	106	5,224
Total	329,564	5,837,729	411,033	7,703,551	335,419	6,492,727
South America:						
Argentina			5,536	83,524		
Bolivia	61	3,018	337	10,687		
Brazil	41,514	851,225	31,055	646,013	5,058	115,281
Chile	150	6,675	2,270	35,632	513	16,120
Ecuador	128	5,729	78	3,685	64	2,588
Peru	55	2,365	68	2,800	73	2,800
Uruguay	210	4,686			471	10,500
Venezuela	175	11,263	16	533	17	1,302
Other South America	80	1,486	61	2,856	54	2,238
Total	42,373	886,447	39,421	785,730	6,250	150,829
Europe:						
Belgium-Luxembourg					5	673
Germany, West	22	1,220				
Greece	1,004	21,046				
Italy					59	981
Norway			15	630	30	1,260
Portugal	331	10,758				
Spain	97	2,445				
Sweden	10	1,288	539	14,553	1,549	40,113
United Kingdom			5	588	20	2,587
Total	1,464	36,757	559	15,771	1,663	45,614
Asia:						
Hong Kong			378	13,500		
Japan	5	779	3	507		
Korea, Republic of			8,118	134,998	9,249	176,609
Philippines	160	4,560	710	19,525	435	19,500
Other Asia	137	5,910				
Total	302	11,249	9,209	168,530	9,684	196,109
Oceania:						
Australia	112	5,550				
French Pacific Islands	19,002	348,976				
Total	19,114	354,526				
Grand total	392,817	7,126,708	460,222	8,673,582	353,016	6,885,279

TABLE 44.—Coke exported from the United States, by countries and customs districts—Continued

	1958		1959		1960	
	Short tons	Value	Short tons	Value	Short tons	Value
CUSTOMS DISTRICT						
Buffalo	79,643	$1,489,449	113,894	$2,115,497	84,525	$1,665,055
Chicago	9,903	81,423	5,073	50,968	20,862	331,479
Dakota	20,138	492,418	10,567	299,903	10,843	296,538
Duluth and Superior	8,232	190,623	6,764	173,588	5,512	129,107
Florida	2,121	77,971	938	34,372	574	19,926
Laredo	3,218	112,275	3,481	124,060	6,898	191,984
Maryland	105	2,224	396	15,064	144	5,237
Massachusetts	8,028	167,000	15,120	280,475		
Michigan	142,309	2,431,290	190,252	3,710,820	149,780	2,832,632
Mobile	395	18,256	904	35,139	4,358	98,718
New Orleans	3,273	109,149	2,359	47,721	328	18,965
New York	18,479	381,454	49,156	973,346	30,205	653,176
Ohio	21,544	169,290	20,000	166,250	14,100	131,835
Philadelphia	52,343	1,029,266	7,113	147,994	3,912	77,307
St. Lawrence	9,050	147,326	8,109	140,195	12,612	212,272
San Diego	465	15,168	987	38,880	970	39,416
Virginia	1,311	28,080	220	4,783	2,020	50,613
Washington	2,083	63,768	3,194	107,109	3,337	109,421
Wisconsin			14,824	128,983		
Other districts	10,177	120,278	6,871	78,435	2,036	21,598
Total	392,817	7,126,708	460,222	8,673,582	353,016	6,885,279

Source: Bureau of the Census.

TECHNOLOGY

Considerable research and development work has been done in recent years in many of the major coke-producing countries of the world on mechanizing coke-oven operations. The principal objectives are (1) to provide greater safety, (2) to improve working conditions, (3) to increase productivity, and (4) to reduce manufacturing costs.

Coke-oven builders and coke-plant operators in the United States have been active for many years, and by the end of 1960 certain phases of coke-oven operations were mechanized. Coal-crushing and handling facilities were to a large extent completely mechanized. Coal-tower doors and charging of the larry cars were operated with push button controls. Automatic controls were installed on much of the equipment used in American coke plants to recover and process the coal-chemical materials. The improvements that were made on facilities servicing the coke ovens (larry cars, pushing machines, and quenching cars) were limited, however, and most of this equipment was operated manually. Recent developments in this field, however, included the use of interlocking and signalling systems on pushing machines and hot cars such as gamma ray and optical systems. Much effort and development work was underway on mechanizing quenching cars, coke wharves, and equipment to remove charge-hole covers, and automation of these operations at some plants could be expected in the near future

The State Scientific Technical Committee of the U.S.S.R. appointed a commission to plan and coordinate the mechanization and automation of coke ovens and related facilities in that country.[6] The first

[6] Taicher, M. M., From the Interim Commission Appointed to Improve the Technology of Coke Production and the Design of Coke Ovens and Their Equipment: Coke and Chem., U.S.S.R., No.8, 1960, pp. 57–58.

meeting of this committee was held in April 1960, and a summary of work that was done on automation of the coke industry in the U.S.S.R. was presented. Also, new measures that should be undertaken were recommended. According to a report presented at this meeting, 44 charging larries were equipped with charge-hatch lid removers; 17 larries at 6 plants were equipped to automatically charge the ovens from the hopper in the desired sequence; devices for accurate positioning of the larry cars were installed on 29 larries at 21 plants. Coke-oven stand pipes on 25 batteries at 10 plants were equipped with iron-to-iron seals; 23 door-cleaning devices were used at 5 works; 6 frame-cleaning mechanisms at 3 plants were placed in operation. Apparatus for removing coal around charging holes was installed on 15 larries at 8 works, and devices for signalling the accurate positioning of the quenching car beneath the door extractor were operating satisfactorily at 20 plants.

This commission recommended that new measures in the future are to include the automation of coal-tower gates, the use of inductive meters for the accurate positioning of the larries on the axis of the oven chambers, the installation of charge-hatch lids with iron-to-iron seals which would eliminate the luting of the lids by a lidman, the use of standpipe lids with iron-to-iron seals controlled from the larry car, the installation of mechanical scrapers on the larry cars for cleaning the elbows or "goosenecks", mechanization for cleaning the doors and frames, the use of an electrical connection between the door extractor and the coke pusher, a loudspeaker link between the machines, and also the use of automatic signalling and blocking units in controlling the quenching car, the coke wharf gates, and the coke-grading conveyors.

In West Germany it was reported that mechanization of coke plants was the major objective of the coke industry, and considerable progress was made on mechanizing equipment for servicing coke ovens.[7] In addition, it was reported that automatic equipment was successfully installed and operated at one coke plant for controlling the oven heating system.

Automatic and centralized control of coke ovens and ancillary facilities were under active study in Great Britain in 1960. The results of centralized control of the coal-handling plant, coke screening plant, and byproduct plant of the National Coal Board coke plant in Durham County, England, will be reviewed in the next issue of this report.

For many years coke-oven builders and coke producers have studied the possibility of developing an efficient continuous carbonization method. In November 1960, a small-scale production unit, called by its designers the "rotary hearth continuous coke oven", was placed in operation near Dorchester, Va. The design or shape of the oven is in the form of a long tunnel bent into an arch. The coal is fed in at one point and the coke comes out after completion of the cycle, causing a continuous process.[8] The operators of this unique carbonizing unit claimed that the process would produce a small size, low-moisture coke suitable for electric furnaces.

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[7] Beck, K. G., Recent Coke Plant Techniques: Stahl u. Eisen, No. 3, Feb. 2, 1961, pp. 195–199.
[8] Patterson, W. L., Revolutionary Process, New Continuous Coke Maker Adopted From Rotary Furnace: Pittsburgh Press, Sept. 15, 1960.

A novel laboratory method of investigating coke strength or breakage was tested by the British Coke Research Association.[9] This method depends upon observation of the passage of shock waves in specimens cut from coke pieces. The production and transmission of the shock waves caused by impact of the coke with a rigid surface were detected and examined by electrical methods, and the nature and duration of the shock stresses were displayed on the screen of a cathode ray oscillograph and recorded photographically. This method was being investigated to determine the effect of porosity and other characteristics upon coke strength.

This organization also studied the formation and nature of organic sulfur in coke, and specialized techniques, such as micro-wave absorption, were used to follow the reaction of the sulfur with coke at various temperatures. "Free radicals" or reactive centers, which are developed in coke between the heating ranges of 300° and 700° C., may interact with free sulfur to give stable carbon-sulfur complexes containing as much as 2 percent sulfur. Because the reaction takes place in the temperature range that includes both the plastic range of semicoke formation and the thermal decomposition of sulfur compounds in the coal, the reaction of sulfur with free radicals in coke was concluded to play a part in the fixation of organic sulfur during carbonization. Also, the effect of the reaction would be modified in practice by the presence of hydrogen and hydrocarbons. Further studies of the interaction of the free radicals with oxygen and sulfur were planned in an attempt to learn more about the reactions.

The Bureau of Mines, United States Department of the Interior, continued to study coal carbonization. Continuing its survey on carbonizing properties of American coals, 20 samples from West Virginia and 6 samples from Virginia were tested in the Bureau of Mines-American Gas Association (BM–AGA) apparatus at the Pittsburgh Coal Research Center. The program to obtain direct correlations between the proposed International Standard Micum Test and the American Society for Testing Materials (ASTM) shatter and tumbler test, which was started in 1959 and reported in the 1959 technology section of the coke chapter, was completed in 1960. In conjunction with the Micum-ASTM coke-testing program, a study of the relationship between the physical properties of pilot-plant and industrial cokes was made. In this study, 17 samples of the coal blends from which the commercial cokes were produced were obtained and carbonized in the BM–AGA apparatus. Chemical and physical properties of the samples were determined, and the physical properties of the cokes produced by the two methods were compared. A high degree of correlation was obtained between the strength indexes of the pilot-plant and industrial cokes. The apparent gravity of industrial coke was consistently higher than that of BM–AGA cokes.

Substantial technical improvement was made on the carbonization of coking coals, using a vertical-entrainment technique at the Denver Coal Research Center in 1960. In the past, it was impossible to use the vertical entrainment techniques to carbonize coking coals because such coals, on heating, were found to soften, agglomerate, and plug the system. However, by using operating techniques originally con-

[9] Coke News, Fundamental Studies: British Coke Res. Assoc., Chesterfield, Derbyshire, England, No. 12, May 30, 1960, 2 pp.

ceived in 1959 and further developed in 1960, it was possible to decrease this agglomeration in pilot-plant tests with each of four coking coals. With one of these coals, using the latest refinement of feeding techniques, all traces of agglomeration were prevented. Several tons of this coal that was carbonized at rates up to 290 pounds per hour yielded over 30 gallons of tar and oil and about 1,300 pounds of highly reactive boiler-plant fuel per ton of coal processed.

Work on carbonization under pressure reported in this section in 1959 was continued in 1960. A new type of carbonization assay apparatus was developed, in which carbonization was conducted under pressure of 100 pounds per square inch; a continuous sweep of hot nitrogen removed vapors before extensive thermal decomposition occured. The new apparatus simulates entrainment carbonization, in which coal particles are rinsed by hot, low-oxygen gas.

The Bureau continued to study low-temperature coal tar in 1960. Characterization or the identification of the components in commercial and experimental tars was continued at the Morgantown Coal Research Center. This work was divided into two parts because different methods for identifying the products had to be used. One part was the characterization of tar distillates and the other was for pitch. Gas-liquid chromatography was used to fractionate three consecutive nonaromatic cuts from a neutral oil distillate fraction, boiling at 246°–248° C., that were obtained from low-temperature bituminous coal tar. Countercurrent distribution, a dual-phase countercurrent solvent fractionation technique, also was used as a method of fractionating.[10]

Because most of the pitch from low-temperature tars consists of relatively high molecular weight, nondistillable substances (such as the so-called resins), the individual constituents of this material cannot be identified, and a different technique was followed. One of the few techniques is ring analysis by way of physical properties. A mathematical treatment of ring index (total rings per carbon atom, R/C) versus atomic hydrogen to carbon ratio (H/C) was developed for several common series of condensed polynuclear aromatic compounds.[11] Each series was shown to have a different set of expressions of R/C and H/C, in terms of R, from which the arrangement of rings can be differentiated for compounds that contain less than 10 rings.

Results of a study of the effects of operating variables on the carbonization process and on the quality of the coke produced was published.[12] This study showed that the coking time varied as a function of the oven width, and that change in oven width and flue temperatures had little or no effect on coke properties, when coking rates were constant.

An annual world review on the pyrolysis of coal was published in the August 1960 issue of Industrial and Engineering Chemistry.[13]

[10] Karr, Jr., C., Estep, P. A., and Hirst, Jr., L. L., Countercurrent Distribution of High-Boiling Phenols From a Low-Temperature Coal Tar: Anal. Chem., vol. 32, No. 4, 1960, pp. 463–475.

[11] Karr, Jr., C., A Note on Determining the Arrangements of Rings in the Polynuclear Aromatic Compounds of Coal Tar Pitch Fractions: Fuel, vol. 39, No. 2, pp. 119–123.

[12] Gayle, J. B. and Eddy, W. H., Studies of Coke Oven Width, Flue Temperature, and Coking Rate: Critical Survey of Literature; Carbonizing Tests With Tuscaloosa Oven: Bureau of Mines Rept. of Investigations 5592, 1960, 35 pp.

[13] Gomez, M., Pyrolysis of Coal: Ind. Eng. Chem., vol. 52, No. 8, August 1960, pp. 717-723.

This review summarized research and technologic studies relating to the following phases of coal pyrolysis: (1) Mechanism, kinetics, and thermochemistry; (2) low- and high-temperature carbonization; and (3) oven operations, products, and byproducts.

WORLD REVIEW

World production of hard or metallurgical coke in 1960, estimated at 306,720,000 short tons was an alltime high, exceeding the previous record of 1957 by 4 percent. The 1960 total was about 17 million tons larger than in 1959 and was the result of increases in virtually all producing countries. The largest gain was made by China—an estimated increase of 3.3 million tons or 14 percent. Increases of more than 1.5 million tons occurred in the U.S.S.R., the United Kingdom, West Germany, and Japan.

The U.S.S.R. led all countries of the world in coke production for the third consecutive year. Output of coke in this country was close to capacity and reflected the heavy demand for metallurgical coke. Estimates based on published data indicate that about 70 percent of the hard-coke output was used in blast furnaces. Production of oven and beehive coke in the United States increased 2 percent over 1959 but was 25 percent below the record of 1957. Although coal-carbonizing capacity in the United States was far greater than in the U.S.S.R., operating rates were lower because of reduced demand for blast-furnace coke. West Germany continued to rank third as a coke-producing country; its output rose 4 percent over 1959 but was lower than the 1957 maximum.

As shown in table 45, Europe produced 63 percent of the estimated world total; North America, 20 percent; Asia, 14 percent; South America, Africa, and Oceania, the remainder. Asia showed the largest increase in production between 1956 and 1960 because of the tremendous increase in China and the substantial gains made by India and Japan.

Table 46 shows coke produced in gas retorts, by low- and medium-temperature carbonization processes, or from lignite or brown coals. Production of coke by all of these processes, which is called soft coke in some countries, amounted to only about one-sixth of the hard-coke production. The leading producers of soft coke were Great Britain and East Germany, which together produced 44 percent of the world total. In Great Britain most of this coke was produced from bituminous coal in gas retorts; about three-fourths of the East German output was derived from lignite or brown coal. The East German coke was probably a carbonized briquet because lignite or brown coal is noncoking. Other large producing countries were West Germany, Japan, Czechoslovakia, and India in the order named.

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TABLE 45.—World production of oven and beehive coke (excluding breeze), by countries [1]

(Thousand short tons)

Country	1956	1957	1958	1959	1960
North America:					
Canada	4,006	3,803	3,314	4,095	3,872
Mexico	702	755	567	751	920
United States	74,483	75,951	53,604	55,864	57,229
Total	79,191	80,509	57,485	60,710	62,021
South America:					
Brazil	525	568	634	574	776
Chile [2]	440	470	440	440	440
Colombia	275	275	330	330	440
Peru	26	34	36	35	35
Total	1,266	1,347	1,440	1,379	1,691
Europe:					
Austria	2,304	2,414	2,082	1,943	2,022
Belgium	8,014	7,888	7,613	7,955	8,310
Bulgaria	11	13	11	17	[2] 17
Czechoslovakia	8,077	8,251	8,124	8,684	9,326
Finland	—	—	—	11	11
France	13,545	13,899	13,742	14,431	14,999
Germany:					
East [3]	807	862	1,097	1,108	[2] 1,200
West [4]	47,879	50,367	48,036	42,472	49,222
Saar	4,636	4,766	4,603	4,890	
Hungary	96	216	369	399	[2] 540
Italy	3,760	4,064	3,704	3,366	4,095
Netherlands	4,688	4,721	4,545	4,545	4,979
Poland	[5] 11,600	11,156	11,722	11,992	12,437
Rumania	282	480	621	671	904
Spain	1,818	2,077	2,261	2,653	2,751
Sweden	147	131	103	133	[2] 140
U.S.S.R.	51,400	53,610	56,100	58,860	[2] 61,100
United Kingdom	22,001	22,950	20,665	19,093	20,966
Yugoslavia	1,017	1,143	1,135	1,179	1,194
Total	182,082	189,008	186,533	184,402	194,213
Asia:					
China [2]	6,100	7,400	19,800	24,300	27,600
India	2,806	2,872	3,386	4,739	4,740
Iran [6]	10	10	10	23	[2] 23
Japan	5,997	6,910	6,510	7,848	9,424
Korea, North [2]	440	440	470	500	550
Taiwan	129	162	203	190	214
Turkey	554	603	614	583	583
Total	16,040	18,400	31,000	38,200	43,140
Africa:					
Rhodesia and Nyasaland, Federation of: Southern Rhodesia	240	255	211	207	258
Union of South Africa	1,626	1,770	1,980	2,200	2,364
Total	1,866	2,025	2,191	2,407	2,622
Oceania:					
Australia	2,497	2,549	2,574	2,507	2,949
New Caledonia [2]	78	78	78	77	77
New Zealand	7	7	7	[2] 7	[2] 7
Total	2,582	2,634	2,659	2,591	3,033
World total	283,027	293,923	281,308	289,689	306,720

[1] Includes revisions of data published previously.
[2] Estimate.
[3] High-temperature coke from lignite.
[4] Includes electrode coke.
[5] Includes gashouse and low-temperature coke.
[6] Year ended March 20 of year following that stated.

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

TABLE 46.—World production of gashouse, low- and medium-temperature coke (excluding breeze), by countries [1]

(Thousand short tons)

Country [2]	1956	1957	1958	1959	1960
North America:					
Canada	61	(3)	(3)	(3)	(3)
United States, retort, low- and medium-temperature	182	(3)	(3)	(3)	(3)
Total [4]	355	270	285	275	275
South America:					
Argentina [4]	60	55	60	60	65
Chile	117	95	[4] 95	[4] 95	[4] 95
Uruguay	33	32	33	31	35
Total	210	182	188	186	195
Europe:					
Austria	497	445	357	276	250
Belgium	1	4	4	1	----------
Czechoslovakia: [4]					
Gashouse	855	855	865	870	870
Lignite	2,000	2,040	2,060	2,060	2,090
Denmark	435	422	340	369	[4] 400
Finland	107	118	139	143	152
France:					
Gashouse [5]	1,778	1,690	1,457	1,112	780
Low-temperature	335	310	304	317	328
Germany:					
East:					
Gashouse	3,081	3,106	3,303	3,456	[4] 3,470
Lignite	7,075	7,303	7,254	[4] 7,830	[4] 7,990
West:					
Gashouse	6,336	6,019	5,467	5,527	5,754
Lignite	645	643	659	656	664
Saar, low-temperature	140	138	125	112	[4] 110
Greece	24	24	23	[4] 28	[4] 28
Hungary	466	538	517	517	[4] 540
Ireland (Eire)	213	205	205	207	[4] 204
Italy	1,103	1,025	913	879	881
Luxembourg	41	40	40	39	37
Netherlands	859	725	625	482	322
Norway [5]	66	62	54	54	44
Poland:					
Gashouse	1,054	1,065	1,065	1,081	[4] 1,070
Low-temperature [4]	110	110	110	110	110
Portugal	41	37	43	39	43
Spain	289	280	297	300	291
Sweden	801	736	697	680	[4] 660
Switzerland	564	561	505	515	342
United Kingdom:					
Great Britain	14,229	13,457	12,483	11,279	11,050
Northern Ireland	179	129	[4] 130	[4] 130	[4] 130
Yugoslavia	25	28	29	23	22
Total	45,900	44,700	43,400	42,400	42,000
Asia:					
Ceylon [4]	13	13	13	13	13
Hong Kong [6]	19	21	20	22	20
India:					
Gashouse	79	127	137	[4] 140	[4] 140
Low-temperature	1,801	1,905	2,027	[4] 1,995	[4] 2,425
Japan:					
Gashouse	2,961	3,328	3,182	3,554	4,101
Low-temperature [4]	75	75	75	75	85
Malaya [4]	19	19	22	22	22
Taiwan:					
Gashouse	13	[4] 17	[4] 17	18	[4] 18
Low-temperature	51	68	[4] 70	[4] 85	[4] 85
Turkey:					
Gashouse	114	111	121	[4] 130	[4] 110
Low-temperature	----------	88	89	91	93
Total	5,310	5,960	6,210	6,585	7,600

See footnotes at end of table.

TABLE 46.—World production of gashouse, low- and medium-temperature coke (excluding breeze), by countries [1]—Continued

(Thousand short tons)

Country [2]	1956	1957	1958	1959	1960
Africa:					
Algeria	97	101	97	98	[4] 95
Union of South Africa	94	97	93	82	67
United Arab Republic (Egypt) [4]	25	25	25	25	30
Total	216	223	215	205	192
Oceania:					
Australia [7]	1,121	1,034	931	[4] 940	[4] 950
New Zealand [8]	83	78	79	79	[4] 85
Total	1,204	1,112	1,010	1,020	1,035
World total	53,200	52,450	51,300	50,670	51,300

[1] Gashouse coke unless otherwise specified. Includes revisions of data published previously. Data do not add to totals shown, owing to rounding.
[2] Production data for China, Mexico, Rumania, and U.S.S.R. not available; estimates included in total.
[3] Concealed to avoid disclosing individual company figures; production included in total.
[4] Estimated.
[5] Data reported previously represented commercially disposable production.
[6] Includes breeze.
[7] Year ended June 30 of year stated.
[8] Year ended March 31 of year following that stated.

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

COAL-CHEMICAL MATERIALS

GENERAL SUMMARY

The production of coal-chemical materials is governed by the output of oven coke, which in turn is dependent on the operating rate of blast furnaces. In the United States about 89 percent of the carbonizing capacity of slot-type or chemical recovery coke ovens is integrated with iron and steel furnaces, and steel production has a definite effect upon the supply of coal chemicals. Steel production increased 11 percent in 1960, and production of all basic coal-chemical materials (crude coal tar, crude light oil, ammonia, and coke-oven gas) also increased over 1959 but was far below the record of 1957. Yields of these chemical raw materials per ton of coal carbonized were slightly larger than in 1959. However, yields of coal-chemical materials have not changed to any large degree in 40 years. Yields are affected to a certain extent by the kind of coal carbonized, operating techniques, and recovery equipment used by the producing companies. As shown in figure 4, yields were largest during the depression years when operating rates of the ovens were low and coking cycles were longer than normal because of the small demand for coke. There were more merchant plants, including gas utility plants, operating during that period, and the coals carbonized by these plants were selected to yield a maximum quantity of gas, which also resulted in high tar and light oil yields. During World War II, there was an acute need for metallurgical coke and the coal blends and operating techniques (high oven temperatures and shorter coking cycles) were adjusted to provide maximum coke production, and consequently, the yield of the basic coal chemicals declined. Demand for light oil

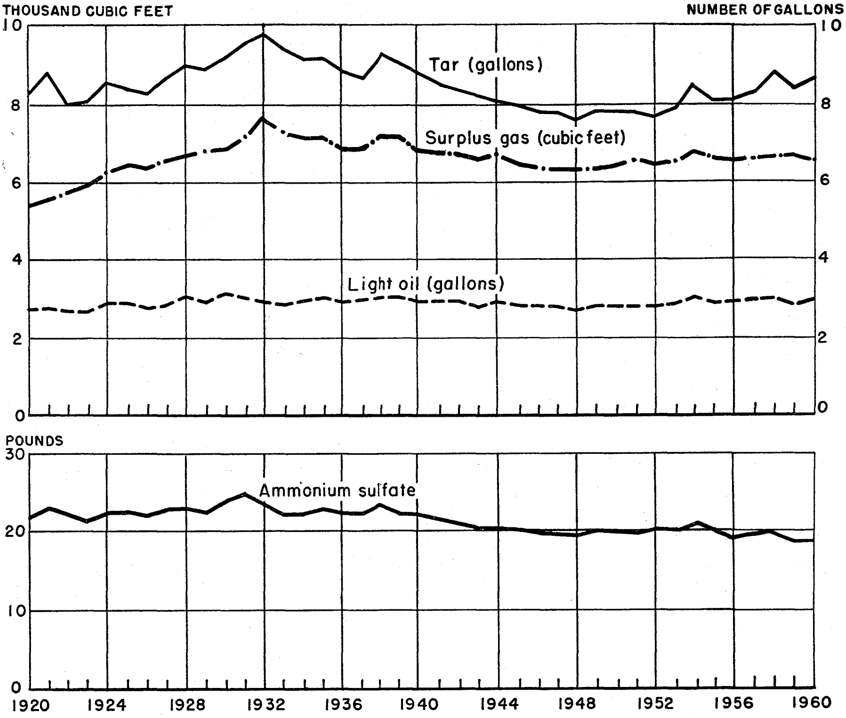

FIGURE 4.—Average yield of principal coal-chemical materials per short ton of coal carbonized in coke ovens. Yields of light oil and ammonium sulfate equivalent represent average for plants recovering these products.

and tar products increased rapidly after World War II, particularly in the 1950's, causing coke-plant operators to improve recovery equipment and processing techniques. Although yields of crude tar, crude light oil, and surplus gas increased over the low quantities of World War II, they did not reach the amounts attained during the 1930's partly because of the change in coal blends, particularly at merchant plants. In 1960, a large proportion of the coke produced at merchant plants was of foundry grade, and coal blends used included substantial percentages of low-volatile bituminous coal and smaller percentages of anthracite fines. While such blends made excellent foundry coke, yield of tar was low—6.8 gallons per ton of coal carbonized in 1960 compared with roughly 9 gallons in the 1930's. Tar yields at furnace plants did not drop as drastically, and although the principal objective of this group is to produce the maximum quantity of high-quality metallurgical coke, every effort is made to recover as much gas, tar, and light oil as economics will justify. Yield at furnace plants in 1960 was 8.85 gallons as compared with about 9 gallons in the 1930's.

In contrast with gas, light oil, and tar, the yield of coke-oven ammonia has not increased in recent years but has declined below the low of World War II. This low yield was due to the meager financial returns from the sale of ammonia products, which caused some iron and steel companies to discontinue producing sulfate. Although improvements in the design of the saturators and auxiliary equipment were made in recent years, thus reducing operating costs, the cost of sulfuric acid, the largest single component in sulfate manufacture, has not been reduced. This unreduced cost had an adverse affect on ammonia recovery, because some steel companies were not attempting to recover the ammonia completely which procedure affected the industry yield. Because of the low financial returns from the sales of ammonium sulfate some companies were studying various methods of recovering ammonia from coke-oven gas without using sulfuric acid or other costly reactants.[14] A paper was presented at the May 1960, meeting of the American Coke and Coal Chemicals Institute, Rye, N.Y., which showed that it would be advantageous for some coke plants to return to manufacturing ammonia liquor because demand for liquor exceeds supply. This change would depend on the individual coke plants and would be governed by the extent to which a given plant had to absorb freight costs on the shipments of the liquor and also whether there was surplus steam capacity to produce the liquor.[15]

The sale of coal-chemical materials serves as a means of reducing the costs of converting coal to coke. Table 48 shows the value credited to each product group in 1960 and several preceding years. The total value credited to coal-chemical materials, whether used by producers or sold, amounted to $3.847 or 22 percent of the value of all products including coke and breeze. Surplus coke-oven gas alone represented 41 percent of the value of coal-chemical materials. Most of the surplus coke-oven gas, however, was used by the producing companies, and value of commercial sales in 1960 amounted to less than 6 percent of the total value of the coal-chemical materials. The total

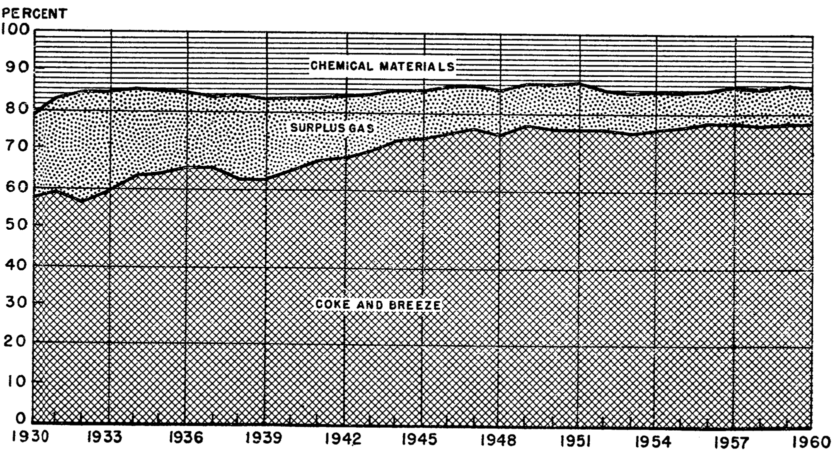

FIGURE 5.—Percentage of total value of coke-oven products from slot-type ovens supplied by coke and breeze, surplus gas, and chemical materials.

[14] Holowaty, M. O. and Taylor, H. L., Removal of Anhydrous Ammonia From Coke-Oven Gas: Proc. of the Blast Furnace, Coke Oven, and Raw Material Conf., Chicago, Ill., vol. 19, April 4-6, 1960, pp. 524-536.
[15] Edwards, C. S., The Competitive Position of Coke-Oven Sulphate: Eastern Regional Meet. of the American Coke and Coal Chem. Inst., Rye, N. Y., May 17, 1960, 5 pp.

value of tar used and sold amounted to $1.257 per ton of coal, of which $0.85 was derived from commercial sales. Returns from the commercial sales of tar and its derivatives, therefore, amounted to more than one-fifth of the value of coal-chemical materials. Revenue from sales of crude light oil and its derivatives amounted to $0.739 per ton of coal or 19 percent; ammonia products comprised only 7 percent. Trends in the percentage of total value of all coke-oven products derived from coal-chemical materials are shown in figure 5.

TABLE 47.—Coal-chemical materials, exclusive of breeze, produced at coke-oven installations in the United States in 1960 [1]

Product	Produced	Sold			On hand Dec. 31
		Quantity	Value		
			Total	Average	
Tar, crude……gallons..	687,559,703	[2] 333,253,840	$42,640,937	$0.128	25,587,405
Tar derivatives:					
Sodium phenolate or carbolate..do….	2,945,432	2,803,810	447,018	.159	292,105
Crude chemical oil (tar acid oil) do….	27,578,681	27,325,877	5,763,027	.211	219,734
Pitch-of-tar: [3]					
Soft……short tons..	748,921	53,608	1,263,976	23.578	21,432
Medium……do….	57,944	46,993	1,266,376	26.948	2,964
Hard……do….	233,667	76,981	2,628,865	34.150	4,744
Other tar derivatives [4]……	------	------	13,778,687	------	------
Ammonia products:					
Sulfate [5]……short tons..	631,643	594,108	17,231,502	29.004	136,124
Liquor (NH_3 content)……do….	14,884	9,397	635,833	67.663	734
Di- and mono-ammonium phosphate short tons..	46,067	36,523	3,977,336	108.899	14,895
Total……	------	------	21,844,671	------	------
Sulfate equivalent of all forms short tons….	735,441	596,624	------	------	------
NH_3 equivalent of all forms….do….	189,598	171,974	------	------	------
Gas:					
Used under boilers, etc. M cubic feet..	[6] 835,292,413	66,368,699	13,107,186	.197	------
Used in steel or allied plants….do….		394,535,298	94,850,750	.240	------
Distributed through city mains M cubic feet..		29,777,016	11,964,585	.402	------
Sold for industrial use……do….		30,095,237	5,812,894	.193	------
Total……	835,292,413	520,776,250	125,735,415	.241	------
Crude light oil……gallons..	[7] 234,500,663	21,280,379	3,845,657	.181	3,320,402
Light oil derivatives:					
Benzene:					
Specification grades (excluding Motor grade)……gallons..	135,326,446	137,784,200	44,166,604	.321	3,585,160
Motor grade……do….	769,949	774,291	141,858	.183	20,415
Toluene (all grades)……do….	30,398,543	31,566,744	6,638,373	.210	1,750,176
Xylene (all grades)……do….	8,075,608	7,853,506	2,061,013	.262	847,063
Solvent naphtha (crude and refined) gallons..	4,586,363	4,578,240	1,209,360	.264	353,179
Other light oil derivatives……do….	3,686,255	1,634,153	224,455	.137	172,195
Total……	182,843,164	184,191,134	54,441,663	.296	6,728,188
Intermediate light oil……gallons….	3,590,177	3,713,616	635,346	.171	116,623
Value of all coal-chemical materials sold..	------	------	274,291,638	------	------

[1] Includes products of tar distillation conducted by coke-oven operators under same corporate name.
[2] Includes 33,345,206 gallons sold to affiliated companies for refining.
[3] Soft—water-softening point less than 110° F.; medium—from 110° to 160° F.; hard—over 160° F.
[4] Creosote oil, cresols, cresylic acid, naphthalene, phenol, pyridine, refined tar, and tar paint.
[5] Includes ammonium thiocyanate.
[6] Includes gas used for heating ovens and gas wasted.
[7] 218,242,334 gallons refined by coke-oven operators to make derived products shown.

Table 49 shows the percentage of coal costs credited to the coal-chemical materials. Coal costs represent between 80 and 85 percent of the cost of producing coke and coal chemicals, and relating product value to coal value provides some measure of economic importance of these products in coal carbonization. As indicated in this table, the relative position of the product groups have not changed since 1947–49, but tar and light oil products have increased while ammonia and surplus gas have decreased.

The value of coal-chemical materials sold, including surplus gas used by producing companies, totaled $274,291,638, an increase of 6 percent over 1959 but a decrease of 23 percent below the record of 1957.

TABLE 48.—Average value of coal-chemical materials used or sold and of coke and breeze produced per short ton of coal carbonized in the United States

Product	1947–49 (average)	1956	1957	1958	1959	1960
Ammonia products	[1] $0.359	$0.315	$0.288	$0.307	$0.331	$0.274
Light oil and its derivatives	[1] .413	.773	.749	.671	.620	.739
Surplus gas used or sold	[1] 1.288	1.481	1.570	1.631	1.584	1.577
Tar and its derivatives (including naphthalene):						
Tar burned by producers [2]	.228	.408	.447	.437	.388	.407
Sold	[1] .553	[1] .772	[1] .802	[1] .909	[1] .784	.850
Other products	[1] .003					
Total	[1] 2.844	3.749	3.856	3.955	3.707	3.847
Coke produced	8.488	12.462	12.885	12.752	12.562	12.956
Breeze produced	.191	.256	.283	.324	.329	.344
Grand total	[1] 11.523	16.467	17.024	17.031	16.598	17.147

[1] Revised figure.
[2] Includes pitch-of-tar.

TABLE 49.—Value of coal recovered by coal-chemical materials in the United States

(Percent)

	1947–49 (average)	1956	1957	1958	1959	1960
Product:						
Ammonia products	4.6	3.4	2.9	3.1	3.3	2.8
Light oil and its derivatives	[1] 5.3	8.3	7.6	6.8	6.3	7.5
Surplus gas used or sold	16.6	15.8	15.8	16.5	16.0	15.9
Tar and its derivatives used or sold (including naphthalene)	[1] 10.0	[1] 12.6	[1] 12.6	[1] 13.6	[1] 11.9	12.7
Other products						
Total	36.5	40.1	38.9	40.0	37.5	38.9
Value of coal per short ton	$7.79	$9.35	$9.91	$9.89	$9.88	$9.89

[1] Revised figure.

TABLE 50.—Coal equivalent of the thermal materials, except coke, produced at oven-coke plants in the United States

Year	Materials produced				Estimated equivalent in heating value [1] (billion B.t.u.)					Coal equivalent (thousand short tons)
	Coke breeze (thousand short tons)	Surplus gas (billion cubic feet)	Tar (thousand gallons)	Light oil (thousand gallons)	Coke breeze	Surplus gas	Tar	Light oil	Total	
1913	735	64	115, 145	3, 000	14, 700	35, 200	17, 272	390	67, 562	2, 600
1918	1, 999	158	263, 299	87, 562	39, 980	86, 900	39, 495	11, 383	177, 758	6, 785
1929	4, 853	508	680, 864	200, 594	97, 060	279, 400	102, 130	26, 077	504, 667	19, 262
1939	3, 354	434	554, 406	170, 963	67, 080	238, 700	83, 161	22, 225	411, 166	15, 693
1947–49 (average)	5, 390	582	715, 779	246, 607	107, 800	320, 100	107, 367	32, 059	567, 326	21, 654
1956	4, 772	664	832, 827	290, 972	95, 436	365, 200	124, 924	37, 826	623, 386	23, 793
1957	4, 863	687	873, 474	301, 088	97, 252	377, 850	131, 021	39, 141	645, 264	24, 628
1958	3, 656	502	669, 316	218, 229	73, 124	276, 100	100, 397	28, 370	477, 991	18, 244
1959	3, 711	515	653, 728	213, 036	74, 220	283, 250	98, 059	27, 695	483, 224	18, 444
1960	3, 705	521	687, 560	234, 501	74, 100	286, 550	103, 134	30, 485	494, 269	18, 865

[1] Breeze, 10,000 B.t.u. per pound; gas, 550 B.t.u. per cubic foot; tar, 150,000 B.t.u. per gallon; and light oil, 130,000 B.t.u. per gallon.

COKE-OVEN GAS

In high-temperature carbonization in slot-type ovens, between 15 to 20 percent by weight of the coal is recovered in the form of gas. In 1960, an average of 10,470 cubic feet of gas equivalent to 17 percent by weight of the coal was recovered. Usually about one-third of the gas is used for underfiring, and the remainder is used by producers under boilers, in open-hearth and other metallurgical furnaces, and sold for residential and industrial heating. The relative value of gas to coke-plant operators varies according to the type of establishment. Coke plants that are affiliated with iron and steel works normally consume all of their surplus gas. For many years, substantial quantities of surplus gas produced by furnace plants was sold to gas utilities for distribution through city mains for residential heating and cooking. In the past several years, the quantity of surplus gas sold by furnace coke plants to gas utilities has decreased because it has been replaced by natural gas. In 1960, furnace plants used 12 percent of their surplus gas under boilers and other coke-plant equipment, 83 percent in metallurgical furnaces, and 2 percent was sold to gas utilities for city distribution.

Nonfurnace or merchant plants do not have this flexibility of disposing of their surplus gas and loss of the gas market for residential heating and cooking seriously affects the economic position of the individual plants. In 1960, of the 46,740 million cubic feet of surplus gas available at merchant-coke plants, 15 percent was used under boilers; 7 percent, in allied plants; 45 percent sold for distribution through city mains; and 33 percent sold for industrial use. Tables 51 and 52 show the production and disposal of coke-oven gas. Table 53 shows the kind and quantity of each type of gas used for heating the coke ovens in 1960.

TABLE 51.—Production and disposal of coke-oven gas in the United States in 1960, by States

(Thousand cubic feet)

State	Produced		Used in heating ovens	Surplus used or sold			Wasted
	Total	Per ton of coal coked		Quantity	Value		
					Total	Average	
Alabama	65,397,266	9.73	31,927,571	32,222,220	$4,412,507	$0.137	1,247,475
California, Colorado, and Utah	52,340,216	11.62	15,635,133	36,203,225	6,664,644	.184	501,858
Connecticut, Maryland, Massachusetts, New Jersey, and New York	105,916,252	10.68	29,680,319	71,223,818	25,731,742	.361	5,012,115
Illinois	29,387,320	10.22	6,959,872	21,098,636	3,827,379	.181	1,328,812
Indiana	119,964,059	10.75	41,446,828	77,988,830	20,818,929	.267	528,401
Kentucky, Missouri, Tennessee, and Texas	26,804,358	9.75	12,803,321	11,333,203	1,619,716	.143	2,667,834
Michigan	43,895,891	9.89	6,424,123	37,432,849	8,842,196	.236	38,919
Minnesota and Wisconsin	12,416,749	10.45	6,123,575	6,029,365	1,179,850	.196	263,809
Ohio	118,425,881	10.09	48,669,109	68,024,020	17,415,831	.256	1,732,752
Pennsylvania	214,065,206	10.48	85,872,418	126,998,893	27,953,827	.220	1,193,895
West Virginia	46,679,215	11.56	14,237,444	32,221,191	7,268,794	.226	220,580
Total 1960	835,292,413	10.47	299,779,713	520,776,250	125,735,415	.241	14,736,450
At merchant plants	84,854,847	9.53	37,079,653	46,740,040	13,847,076	.296	1,035,154
At furnace plants	750,437,566	10.59	262,700,060	474,036,210	111,888,339	.236	13,701,296
Total 1959	804,600,058	10.35	279,081,688	514,970,524	123,123,822	.239	10,547,846

TABLE 52.—Surplus coke-oven gas used by producers in the United States and sold in 1960, by States

(Thousand cubic feet)

State	Used by producers—					
	Under boilers, etc.			In steel or allied plants		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Alabama	11,413,036	$1,542,226	$0.135	17,062,209	$2,358,054	$0.138
California, Colorado, and Utah	----------	----------	----------	[1]	[1]	[1]
Connecticut, Maryland, Massachusetts, New Jersey, and New York	[1]	[1]	[1]	51,064,248	16,734,870	.328
Illinois	[1]	[1]	[1]	17,889,454	3,549,822	.198
Indiana	9,578,586	2,543,248	.266	56,593,886	14,653,647	.259
Kentucky, Missouri, Tennessee, and Texas	5,307,294	612,993	.116	[1]	[1]	[1]
Michigan	[1]	[1]	[1]	31,770,027	7,284,277	.229
Minnesota and Wisconsin	3,157,569	493,751	.156	[1]	[1]	[1]
Ohio	11,290,770	2,900,792	.257	48,441,583	13,000,227	.268
Pennsylvania	16,950,726	3,243,428	.191	104,479,303	23,199,723	.222
West Virginia	[1]	[1]	[1]	[1]	[1]	[1]
Undistributed	8,670,718	1,770,748	.204	67,234,588	14,070,130	.209
Total 1960	66,368,699	13,107,186	.197	394,535,298	94,850,750	.240
At merchant plants	7,145,205	1,175,553	.165	2,967,654	647,057	.218
At furnace plants	59,223,494	11,931,633	.201	391,567,644	94,203,693	.241
Total 1959	62,957,231	12,088,661	.192	384,536,696	90,323,508	.235

See footnote at end of table.

TABLE 52.—Surplus coke-oven gas used by producers in the United States and sold in 1960, by States—Continued

(Thousand cubic feet)

State	Sold					
	Distributed through city mains			For industrial use		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Alabama	(1)	(1)	(1)	(1)	(1)	(1)
California, Colorado, and Utah	---	---	---	(1)	(1)	(1)
Connecticut, Maryland, Massachusetts, New Jersey, and New York	19,176,695	$8,758,852	$0.457	(1)	(1)	(1)
Illinois	---	---	---	(1)	(1)	(1)
Indiana	(1)	(1)	(1)	(1)	(1)	(1)
Kentucky, Missouri, Tennessee, and Texas	---	---	---	(1)	(1)	(1)
Michigan	---	---	---	(1)	(1)	(1)
Minnesota and Wisconsin	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	---	---	---	8,291,667	$1,514,812	$0.183
Pennsylvania	5,568,864	1,510,676	.271	---	---	---
West Virginia	(1)	(1)	(1)	---	---	---
Undistributed	5,031,457	1,695,057	.337	21,803,570	4,298,082	.197
Total 1960	29,777,016	11,964,585	.402	30,095,237	5,812,894	.193
At merchant plants	21,096,225	9,181,130	.435	15,530,956	2,843,336	.183
At furnace plants	8,680,791	2,783,455	.321	14,564,281	2,969,558	.204
Total 1959	34,809,978	14,782,947	.425	32,666,619	5,928,706	.181

[1] Included with "Undistributed" to avoid disclosing individual company figures.

TABLE 53.—Coke-oven gas and other gases used in heating coke ovens in the United States in 1960, by States [1]

(Thousand cubic feet)

State	Coke-oven gas	Producer gas	Blast-furnace gas	Natural gas	Other gases [2]	Total coke-oven gas equivalent
Alabama	31,927,571	---	---	79,947	---	32,007,518
California, Colorado, and Utah	15,635,133	---	7,866,356	109,127	---	23,610,616
Connecticut, Maryland, Massachusetts, New Jersey, and New York	29,680,319	2,435,939	12,051,479	1,861,764	---	46,029,501
Illinois	6,959,872	---	4,265,360	---	---	11,225,232
Indiana	41,446,828	---	10,102,413	6,195,173	---	57,744,414
Kentucky, Missouri, Tennessee, and Texas	12,803,321	---	---	---	---	12,803,321
Michigan	6,424,123	---	13,605,194	82,241	---	20,111,558
Minnesota and Wisconsin	6,123,575	182,607	---	---	---	6,306,182
Ohio	48,669,109	---	3,692,788	32,090	---	52,393,987
Pennsylvania	85,872,418	---	1,494,377	1,111,206	---	88,478,001
West Virginia	14,237,444	---	5,223,391	---	---	19,460,835
Total 1960	299,779,713	2,618,546	58,301,358	9,471,548	---	370,171,165
At merchant plants	37,079,653	2,618,546	---	2,093,963	---	41,792,162
At furnace plants	262,700,060	---	58,301,358	7,377,585	---	328,379,008
Total 1959	279,081,688	3,337,755	59,808,504	12,570,913	426,258	355,225,118

[1] Adjusted to an equivalent of 550 B.t.u. per cubic foot.
[2] Blue-water gas, liquefied petroleum, propane, and hydrogen-free coke-oven gas (spillage gas).

CRUDE COAL TAR AND DERIVATIVES

The slight gain in the operating rate of oven-coke plants in 1960 caused tar output to increase 5 percent over 1959 and the yield of tar increased 2 percent. Tar yields vary widely among coke plants, depending on the rank and grade of coal carbonized, oven temperatures, completeness of recovery, and other factors. The yield of tar in 1960 ranged from 3.94 gallons per ton of coal carbonized to 11.28. The highest yield was achieved at plants carbonizing large proportions of high-volatile coal which was largely responsible for the high yields in West Virginia, and the Western States (California, Colorado, and Utah). The lowest yield occurred in States where plants produced foundry coke and anthracite fines were used in the coal mix. As shown in table 54, yields were lowest in the group of States consisting of Kentucky, Missouri, Tennessee, and Texas and for the Minnesota-Wisconsin combination.

Crude tar may be used as a fuel or processed into numerous derivatives by fractional distillation. The use of crude tar as fuel in 1960 was much smaller than it was several decades ago although 12 percent was burned without any processing. A small quantity representing less than 1 percent was used for miscellaneous purposes such as tarring ingot molds, road material around plants, and tar paints. The remainder or 88 percent was either processed by the producers or sold to tar distillers for refining. In processing tar, it may be completely refined or it may be partially refined or "topped." Topping primarily strips the low-boiling fractions (usually under 300° C.) from the crude tar. These are rich in tar acids, bases, and naphthalene. The residual tar or soft pitch is generally used by the producing companies as fuel. As a rule small coke plants cannot construct and operate tar-distillation plants profitably and consequently sell their tar to distillers. The larger plants usually are associated with iron and steel works and can burn, process, or sell their crude tar depending on economic conditions. A number of coke plants in recent years have adopted the procedure of allowing tar-distilling companies to top the tar and purchasing the crude chemical oil fractions for further processing. The resultant soft pitch or "topped" tar is returned to the tar-producing companies where it is used as metallurgical fuel. In this way the tar acids (phenol, cresols, naphthalene) are recovered, and the residue is an excellent fuel. The foregoing procedure furnished the 32-percent increase in producing crude chemical oil in 1960 over 1959. The average value of crude chemical oil increased slightly over 1959, but because of the increase in quantity sold, total realization from sales advanced 31 percent. Sales of pitch continued to increase in 1960. Until the past several years, little if any pitch was sold by coke-oven operators. However, the demand for various pitch products has stimulated the marketing of this commodity, and 17 percent of the output was sold. Other tar derivatives produced at coke plants included creosote oil, naphthalene, phenol, cresols, and cresylic acid, but because there were less than three companies making these products, statistics are not published to prevent disclosing individual company figures. Monthly and annual data on these commodities and other coal chemicals are supplied to the U.S. Tariff Commission for inclusion in its monthly and annual publication of synthetic organic chemicals.

TABLE 54.—Coke-oven tar produced in the United States, used by producers, and sold, in 1960, by States

(Gallons)

State	Produced		Used by producers—		
	Total	Per ton of coal coked	For refining or topping	As fuel	Otherwise
Alabama	51,456,113	7.66	18,755,514	606,229	50,471
California, Colorado, and Utah	46,078,349	10.23	6,041,521	20,405,509	36,180
Connecticut, Maryland, Massachusetts, New Jersey, and New York	87,366,632	8.81	23,920,900	33,368,953	79,714
Illinois	21,095,537	7.34			
Indiana	85,651,159	7.68	48,688,817		
Kentucky, Missouri, Tennessee, and Texas	18,772,982	6.83			21,905
Michigan	32,603,849	7.34			6,600
Minnesota and Wisconsin	8,347,610	7.02			2,600
Ohio	97,057,867	8.27	9,372,664	14,033,449	207,301
Pennsylvania	197,877,340	9.69	137,138,800	16,732,078	308,950
West Virginia	41,252,265	10.22	31,392,104		
Total 1960	687,559,703	8.62	275,310,320	85,146,218	713,721
At merchant plants	60,504,997	6.80	826,991		
At furnace plants	627,054,706	8.85	274,483,329	85,146,218	713,721
Total 1959	653,728,164	8.41	205,796,682	109,447,100	1,537,022

State	Sold for refining into tar products [1]			On hand Dec. 31
	Quantity	Value		
		Total	Average	
Alabama	30,799,048	$3,967,201	$0.129	3,684,663
California, Colorado, and Utah	18,496,460	2,464,483	.133	2,391,230
Connecticut, Maryland, Massachusetts, New Jersey, and New York	32,071,934	4,017,520	.125	3,947,198
Illinois	21,013,520	2,882,721	.137	617,527
Indiana	38,273,018	5,076,377	.133	1,331,998
Kentucky, Missouri, Tennessee, and Texas	19,109,210	2,421,105	.127	318,234
Michigan	33,662,986	4,191,812	.125	912,852
Minnesota and Wisconsin	8,475,205	1,070,272	.126	666,651
Ohio	74,152,973	9,327,727	.126	3,224,971
Pennsylvania	47,581,021	6,031,308	.127	7,275,317
West Virginia	9,618,465	1,190,411	.124	1,216,764
Total 1960	333,253,840	42,640,937	.128	25,587,405
At merchant plants	59,686,198	7,649,229	.128	2,283,340
At furnace plants	273,567,642	34,991,708	.128	23,304,065
Total 1959	334,716,614	42,633,118	.127	31,709,151

[1] Comprises 33,345,206 gallons valued at $4,252,007 sold to affiliated companies and 299,908,634 gallons valued at $38,388,930 sold to other purchasers.

COKE-OVEN AMMONIA

Table 55 shows the production and sales of ammonia products, by States, in 1960. In carbonizing coal, about 5 pounds of ammonia per ton of coal carbonized is recovered either as an aqueous solution known as ammonia liquor or as a crystalline solid such as ammonium sulfate or diammonium phosphate. In 1960, 54 plants made sulfate; 10 plants, ammonia liquor; 3 plants, diammonium phosphate; and 1

TABLE 55.—Coke-oven ammonia produced in the United States and sold in 1960, by States

(Short tons)

State	Active plants[1]	Produced			
		Sulfate equivalent	Pounds per ton of coal coked	As sulfate[2]	As liquor (NH_3 content)
Alabama	7	70,609	21.02	68,967	423
California, Colorado, and Utah[3]	4	52,211	23.18	52,211	----------
Connecticut, Maryland, Massachusetts, New Jersey, and New York[4]	7	90,166	18.19	83,402	1,744
Illinois	5	28,077	20.29	28,077	----------
Indiana	5	89,258	16.00	77,644	2,994
Kentucky, Tennessee, and Texas	3	20,219	15.94	7,105	3,381
Michigan[3]	4	41,030	18.49	31,750	2,393
Minnesota and Wisconsin	3	7,440	12.52	4,881	660
Ohio	12	94,075	16.69	81,317	3,289
Pennsylvania	13	200,873	19.75	200,873	----------
West Virginia	3	41,483	20.55	41,483	----------
Undistributed	----------	----------	----------	----------	----------
Total 1960	66	735,441	18.80	677,710	14,884
At merchant plants	15	79,836	19.27	34,210	11,764
At furnace plants	51	655,605	18.74	643,500	3,120
Total 1959	69	716,703	18.70	659,642	14,709

State	Sold[5]				On hand Dec. 31	
	As sulfate[2]		As liquor (NH_3 content)		Sulfate[2]	Liquor (NH_3 content)
	Quantity	Value	Quantity	Value		
Alabama	60,648	$2,005,974	436	(6)	19,548	18
California, Colorado, and Utah[3]	36,742	2,711,123	----------	----------	24,992	----------
Connecticut, Maryland, Massachusetts, New Jersey, and New York	86,474	2,487,285	----------	----------	7,833	29
Illinois	27,852	908,775	----------	----------	2,787	----------
Indiana	67.973	2,209,592	3,081	(6)	21,021	24
Kentucky, Tennessee, and Texas	7,245	211,177	2,845	(6)	578	67
Michigan[3]	31,100	2,091,998	----------	----------	4,909	49
Minnesota and Wisconsin	5,551	182,279	623	(6)	124	89
Ohio	81,514	2,491,876	2,412	(6)	11,915	458
Pennsylvania	184,780	4,798,301	----------	----------	52,106	----------
West Virginia	40,752	1,110,458	----------	----------	5,206	----------
Undistributed	----------	----------	----------	$635,833	----------	----------
Total 1960	630,631	21,208,838	9,397	635,833	151,019	734
At merchant plants	31,002	1,293,995	6,206	452,866	4,771	686
At furnace plants	599.629	19,914,843	3,191	182,967	146,248	48
Total 1959	704,034	24,823,917	14,061	922,901	104,314	1,051

[1] Number of plants that recovered ammonia.
[2] Includes diammonium and monoammonium phosphate and ammonium thiocyanate.
[3] Figures include diammonium phosphate.
[4] Figures include monoammonium phosphate and ammonium thiocyanate.
[5] Includes 70,461 tons valued at $1,374,085 exported.
[6] Included with "Undistributed" to avoid disclosing individual company figures.

plant, monoammonium phosphate. Until the middle 1950's, about 85 percent of the ammonia was recovered in the form of ammonium sulfate and the remainder, as ammonia liquor. In 1960, 86 percent of the ammonia was converted into ammonium sulfate, 8 percent was recovered as ammonia liquor, and 6 percent was made into diammonium and monoammonium phosphate.

Coke-oven ammonium sulfate and diammonium phosphate are used exclusively for agricultural purposes as fertilizer material. Ammonia liquor is used in industry and in agriculture, but no data are collected from the producing companies on the quantities so used. Ammonia liquor consumed in industry comprises such uses as in manufacturing soda ash, ammonium chloride, sulfuric acid, and household aqua ammonia.

Prices of coke-oven ammonium sulfate are to a large extent governed by prices of synthetic anhydrous ammonia. In order to be competitive, prices of coke-oven ammonium sulfate were reduced in 1960, averaging \$29.004 per ton compared with \$29.687 in 1959. The average value per ton of diammonium phosphate also declined, but value of ammonia liquor increased \$2.027 per ton.

CRUDE LIGHT OIL AND DERIVATIVES

Production of crude light oil increased 10 percent in 1960 mainly because of the gain in quantity of coal carbonized and to a lesser extent because of the slight increase in yield. In the United States all but a small proportion of the light oil is recovered from the gas stream. High-temperature coal tar contains a very small percentage of light oil; our statistics do not distinguish between light oil recovered from the gas stream and from coal tar. Sixty-seven of the 72 active plants recovered crude light oil in 1960, and 93 percent of the output was processed by the coke-oven operators. In processing crude light oil, between 60 and 65 percent is recovered as benzene, 12 to 14 percent as toluene, 3 to 4 percent as xylene, 2 to 3 percent as solvent naphtha, and 2 to 3 percent as other salable products (table 57). Usually about

TABLE 56.—Coke-oven crude light oil produced in the United States and derived products produced and sold in 1960, by States

(Gallons)

State	Active plants[1]	Crude light oil				Derived products		
		Produced	Per ton of coal coked	Refined on premises[2]	On hand Dec. 31	Produced	Sold[3]	
							Quantity	Value
Alabama	7	17,082,712	2.54	16,444,574	325,354	12,779,088	12,974,232	\$4,021,386
California, Colorado, and Utah	4	15,234,401	3.38	15,247,177	169,977	12,740,366	12,793,271	3,467,918
Connecticut, Maryland, Massachusetts, New Jersey, and New York	7	32,180,583	3.25	35,715,818	467,906	30,224,102	30,469,190	9,086,789
Illinois	5	8,744,340	3.16	6,125,512	105,403	5,086,793	5,101,930	1,521,820
Indiana	4	32,874,164	3.09	32,647,555	64,553	28,642,158	29,186,610	8,643,860
Kentucky, Missouri, Tennessee, and Texas	5	7,199,858	2.62	3,349,464	140,097	2,920,501	2,896,464	837,977
Michigan and Wisconsin	5	13,001,717	2.70	7,090,006	273,293	5,826,921	5,990,251	1,739,230
Ohio	13	32,220,965	2.74	28,107,150	404,375	23,018,525	22,870,437	6,641,614
Pennsylvania	14	63,949,031	3.13	61,495,231	1,337,237	50,957,953	51,016,287	15,474,719
West Virginia	3	12,012,892	2.97	12,019,847	32,207	10,646,757	10,892,462	3,006,350
Total 1960	67	234,500,663	2.99	218,242,334	3,320,402	182,843,164	184,191,134	54,441,663
At merchant plants	16	19,761,782	2.45	13,797,894	812,114	11,616,663	11,622,767	3,308,838
At furnace plants	51	214,738,881	3.06	204,444,440	2,508,288	171,226,501	172,568,367	51,132,825
Total 1959	69	213,036,193	2.81	198,380,360	3,863,545	161,988,753	163,837,395	44,643,412

[1] Number of plants that recovered crude light oil.
[2] Includes small quantity of material also reported in sales of crude light oil in table 47.
[3] Excludes 21,280,379 gallons of crude light oil valued at \$3,845,657 sold as such.

TABLE 57.—Yield of light-oil products from refining crude light oil at oven-coke plants in the United States

(Percent)

Year	Benzene		Toluene (all grades)	Xylene (all grades)	Solvent naphtha (crude and refined)	Other light-oil products
	Motor	All other grades				
1929	54.4	12.8	9.4	(1)	3.7	3.4
1939	48.6	15.4	12.1	2.5	2.9	3.8
1947-49 (average)	6.5	59.2	11.7	3.1	2.3	3.3
1956	(2)	63.0	13.5	3.7	2.1	2.3
1957	.6	61.9	13.1	3.7	2.2	2.8
1958	.7	58.2	13.8	4.1	2.2	2.3
1959	.3	60.4	13.6	3.8	2.0	1.6
1960	.4	62.0	13.9	3.7	2.1	1.7

1 Included with "Solvent naphtha (crude and refined)".
2 Included with "Other light-oil products" to avoid disclosing individual company figures.

80 to 85 percent of the crude light oil processed is recovered in the form of salable products. The most important derivative is benzene which is widely used in the organic chemical industry. Requirements of benzene for chemical processing rose from about 36 million gallons in 1940 to more than 490 million gallons in 1960, a twelve-fold increase. Demand increased faster than supply, and until 1950, deficits in domestic supply were made up from imports. Beginning in the early 1950's, the petroleum industry began to produce benzene and production from this source increased rapidly and by 1958, production of petroleum benzene exceeded that from coal for the first time. In 1959, production of petroleum benzene amounted to 60 percent of the total United States output excluding exports, and in 1960 it was 68 percent. Production of benzene by coke-plant operators, tar distillers, and petroleum refiners is shown in table 60.

The principal uses for benzene are in manufacturing intermediate organic chemicals such as styrene, adipic acid, phenol, and aniline, which in turn are used to make finished products such as synthetic rubber, nylon, plastics, and dyes. End uses for benzene have been estimated for a number of years by the Chemical Committee of the American Coke and Coal Chemicals Institute, and their latest estimates are shown in table 62.

Production of toluene and xylene from coke-oven light oil represents only a small part of the United States supply of these two aromatics. According to preliminary data published by the U.S. Tariff Commission, only 11 percent of the toluene production and 3 percent of the xylene were derived from coal in 1960. The petroleum industry began making toluene and xylene much earlier than benzene, becoming major producers of each commodity during World War II. In recent years, there has been a radical change in the price structure of benzene and toluene. Before World War II, toluene prices were almost double those of benzene. Most of the benzene was used for the blending of automotive fuel, and prices were governed by prevailing gasoline prices. At this time, most of the toluene was sold for use as a solvent chemical synthesis, and explosives. Conditions reversed themselves in recent years. Nearly all of the benzene is now used in chemical processing; about two-thirds of the toluene is used as an additive to

TABLE 58.—**Light-oil derivatives produced at oven-coke plants in the United States and sold in 1960, by States**

(Gallons)

State	Benzene (all grades except Motor)				Toluene (all grades)			
	Produced	Yield from crude light oil refined (percent)	Sold		Produced	Yield from crude light oil refined (percent)	Sold	
			Quantity	Value			Quantity	Value
Alabama	9,647,694	58.7	9,800,703	$3,276,382	2,213,081	13.5	2,342,682	$521,711
California, Colorado, and Utah	8,601,309	56.4	9,154,632	2,641,341	2,077,018	13.6	2,136,694	451,319
Illinois	4,056,977	66.2	4,102,253	1,305,014	759,564	12.4	731,196	163,490
Indiana	22,515,823	69.0	23,305,615	7,391,969	4,284,728	13.1	4,315,703	859,421
Maryland, Massachusetts, and New York	22,941,265	64.2	23,041,155	7,435,519	5,209,279	14.6	5,364,960	1,167,661
Michigan and Wisconsin	4,501,739	63.5	4,597,485	1,448,974	813,057	11.5	873,905	196,698
Missouri, Tennessee, and Texas	2,389,839	71.3	2,404,898	736,247	331,694	9.9	303,163	65,449
Ohio	17,110,305	60.9	17,159,256	5,374,012	3,508,616	12.5	3,733,034	823,192
Pennsylvania	36,039,775	58.6	36,571,578	12,184,812	9,058,433	14.7	9,508,878	1,958,282
West Virginia	7,521,720	62.6	7,646,625	2,372,334	2,143,073	17.8	2,256,529	431,150
Total 1960	135,326,446	62.0	137,784,200	44,166,604	30,398,543	13.9	31,566,744	6,638,373
At merchant plants	8,354,565	60.5	8,255,653	2,600,637	1,909,137	13.8	1,973,675	444,692
At furnace plants	126,971,881	62.1	129,528,547	41,565,967	28,489,406	13.9	29,593,069	6,193,681
Total 1959	119,831,005	60.4	123,489,823	35,707,371	26,963,931	13.6	26,506,642	5,465,911

State	Xylene (all grades)				Solvent naphtha (crude and refined)			
	Produced	Yield from crude light oil refined (percent)	Sold		Produced	Yield from crude light oil refined (percent)	Sold	
			Quantity	Value			Quantity	Value
Alabama	631,285	3.8	572,507	$162,954	200,388	1.2	173,127	$48,534
California, Colorado, and Utah	398,754	2.6	402,195	103,712	632,118	4.1	640,222	165,855
Illinois	141,943	2.3	139,172	38,358	42,724	.7	43,724	12,276
Indiana	518,536	1.6	406,827	110,398	1,037,333	3.2	1,076,750	271,986
Maryland, Massachusetts, and New York	1,370,138	3.8	1,337,884	369,520	97,150	.3	114,641	27,344
Michigan and Wisconsin	208,381	2.9	218,430	55,704	2,805	(1)	----------	----------
Missouri, Tennessee, and Texas	120,862	3.6	115,342	24,657	78,106	2.3	73,061	11,624
Ohio	1,309,201	4.7	1,331,687	290,946	554,452	2.0	571,731	145,982
Pennsylvania	2,711,269	4.4	2,652,945	745,418	1,869,285	3.0	1,816,916	518,881
West Virginia	665,239	5.5	676,517	159,346	72,002	.6	68,068	6,878
Total 1960	8,075,608	3.7	7,853,506	2,061,013	4,586,363	2.1	4,578,240	1,209,360
At merchant plants	458,962	3.3	476,565	132,119	70,975	.5	82,049	18,983
At furnace plants	7,616,646	3.7	7,376,941	1,928,894	4,515,388	2.2	4,496,191	1,190,377
Total 1959	7,523,530	3.8	7,640,893	2,114,363	4,023,251	2.0	3,791,371	1,011,033

[1] Less than 0.05 percent.

aviation gasoline. Prices have changed and in 1960 benzene prices ranged from $0.08 to $0.10 per gallon higher than toluene prices.

Because of the declining demand for toluene for aviation fuel (new Jet planes do not require high-octane gasoline) and the price differential between toluene and benzene, several dealkylation processes were developed to convert toluene into benzene. Dealkylation processes are claimed to permit a flexibility in operations. Petroleum refiners,

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installing such units, could control production of benzene and toluene, depending on the demand for these commodities. Except for benzene, which increased $0.032 per gallon, or 11 percent, average prices for all other light-oil derivatives produced at coke plants varied only slightly. The average price of toluene increased; the average price for xylene and solvent naphtha declined.

TABLE 59.—Benzene and toluene produced at oven-coke plants in the United States, by grades

(Gallons)

Year	Benzene				Toluene		
	Motor	Nitration (1° C.)	Industrial pure (2° C.)	All other	Nitration (1° C.)	Industrial pure (2° C.)	All other
1941	106,372,000	15,414,500	18,286,400	4,182,600	14,689,800	13,268,500	1,378,900
1947-49 (average)	15,246,900	38,335,100	98,395,100	2,535,900	21,407,400	5,529,200	568,600
1956	(1)	74,312,800	97,393,000	2,720,200	29,673,600	7,564,500	(2)
1957	1,834,300	88,262,900	79,421,900	11,567,500	30,716,800	7,268,300	(2)
1958	1,389,800	77,427,100	38,679,200	2,173,400	22,554,600	5,517,800	(2)
1959	497,300	85,955,000	32,036,100	1,839,900	21,160,700	4,787,900	1,015,300
1960	769,900	100,907,000	32,536,800	1,882,600	24,129,300	6,269,200	(2)

[1] Withheld to avoid disclosing individual company figures.
[2] Included with "Industrial pure C." to avoid disclosing individual company figures.

TABLE 60.—Production of benzene (excluding Motor grade) in the United States [1]

(Thousand gallons)

Year	From tar distilleries [2]					From coke-oven operations				
	Produced	Percent of total	Sold			Produced	Percent of total	Sold		
			Quantity	Value				Quantity	Value	
				1,000 dollars	Average per gallon				1,000 dollars	Average per gallon
1947-49 (average)	15,434	10.0	7,288	$1,505	$0.21	139,266	90.0	137,671	$25,413	$0.19
1956	50,551	15.0	34,698	10,377	.30	174,426	51.8	173,420	59,548	.34
1957	36,112	10.9	24,787	8,911	.36	179,252	54.1	171,944	59,080	.34
1958	26,781	9.3	17,000	7,525	.44	118,280	41.2	118,740	36,985	.31
1959	18,498	5.3	9,055	2,694	.30	119,831	34.5	123,490	35,707	.29
1960	[3] 12,787	2.8	[3] 635	[3] 187	.29	135,326	29.6	137,784	44,167	.32

See footnotes at end of table.

TABLE 60.—Production of benzene (excluding Motor grade) in the United States [1]—Continued

(Thousand gallons)

Year	From petroleum refineries					Total				
	Produced	Percent of total	Sold			Produced	Percent of total	Sold		
			Quantity	Value				Quantity	Value	
				1,000 dollars	Average per gallon				1,000 dollars	Average per gallon
1947–49 (average)	(4)	(4)	(4)	(4)	(4)	154,700	100.0	144,959	$26,918	$0.19
1956	111,613	33.2	76,331	$32,834	$0.43	336,590	100.0	284,449	102,759	.36
1957	116,184	35.0	79,773	29,991	.38	331,548	100.0	276,504	97,982	.35
1958	142,109	49.5	107,568	34,812	.32	287,170	100.0	243,308	79,322	.33
1959	208,789	60.2	197,911	57,789	.29	347,118	100.0	330,456	96,190	.29
1960	[3] 309,210	67.6	[3] 239,008	[3] 73,209	.31	457,323	100.0	377,427	117,563	.31

[1] U.S. Tariff Commission.
[2] Includes benzene made from imported crude light oil.
[3] Preliminary figure.
[4] Small quantity included in "From tar distilleries."

TABLE 61.—Estimated supply of specification grades of benzene (excluding Motor grade) in the United States

(Thousand gallons)

	1950–54 (average)	1955	1956	1957	1958	1959	1960
Production from domestic crude material:							
By coke ovens [1]	159,892	174,220	174,426	179,252	118,280	119,831	135,326
By tar distillers [2]	17,500	15,000	15,000	13,000	9,000	10,000	11,000
By petroleum refiners [3]	46,635	98,588	111,613	116,184	142,109	[4] 208,789	[5] 309,210
Total	224,027	287,808	301,039	308,436	269,389	338,620	455,536
Imports (pure benzene equivalent) [6]	32,042	30,476	66,063	52,557	[4] 44,478	54,469	36,221
Total supply	256,069	318,284	367,102	360,993	313,867	393,089	491,757

[1] Federal Bureau of Mines.
[2] Estimated.
[3] U.S. Tariff Commission.
[4] Revised figure.
[5] Preliminary figure.
[6] Official import statistics published by the Bureau of the Census, U.S. Department of Commerce, do not differentiate between crude and pure benzene. Pure benzene equivalent of imports estimated at 95 percent.

TABLE 62.—Estimated consumption of commercial benzene (excluding Motor grade) in the United States, by uses [1]

(Thousand gallons)

Use	1957	1958	1959	1960	1961 (preliminary)
Styrene	142,000	149,000	190,000	211,000	217,000
Phenol (synthetic)	70,000	64,000	89,000	99,000	100,000
Detergents (synthetic)	34,000	37,000	37,000	35,000	38,000
Fibers (synthetic)	30,000	30,000	30,000	40,000	50,000
Aniline	14,000	12,000	16,000	15,000	16,000
DDT	12,000	14,000	15,000	16,000	15,000
Di- and mono-chlorobenzene	9,000	8,000	15,000	15,000	16,000
Maleic anhydride	7,000	7,500	12,000	14,000	16,000
Benzene hexachloride	3,500	2,500	2,500	3,000	2,500
Diphenyls	4,500	4,500	4,500	4,500	4,500
Nitrobenzene	2,000	2,000	2,000	2,000	2,000
Miscellaneous	20,000	20,000	25,000	15,000	25,000
Exported	3,000	11,500	7,000	23.500	30,000
Total	351,000	362,000	445,000	493,000	532,000

[1] Coal-Chemicals Committee, American Coke and Coal-Chemicals Institute, Washington, D.C.

Fuel Briquets and Packaged Fuel

By Eugene T. Sheridan [1] and Virginia C. Berté [2]

Contents

GENERAL SUMMARY

DOMESTIC production of fuel briquets and packaged fuel continued to decline in 1960, and output was 14 percent and 27 percent, respectively, less than in 1959. These fuels are used chiefly for residential heating and cooking in the United States, but their use has steadily decreased in the past 10 years because of inroads by fuel oil and natural gas in the domestic heating field.

Briquets were produced by 14 plants with a total annual capacity of 2.6 million tons. Less than 1 million tons of briquets was produced, however, as all plants operated at reduced rates and the rate of operation of the industry was less than one-third capacity. Packaged fuel was produced by 19 plants; this industry is much smaller, however, having an annual capacity of only 123 thousand tons. Packaged-fuel plants operated at less than one-fourth capacity.

Wisconsin was the chief briquet producer and Michigan the chief producer of packaged fuel. Both States are in the Central region where more than half of the briquets and seven-eighths of the packaged fuel was produced.

More than half the briquets and nearly all packaged fuel were manufactured from low-volatile bituminous coal. Binders were starch, asphalt, and coal tar pitch; asphalt was the chief briquet binder and starch was the preferred packaged-fuel binder.

The total values of production were $10.4 million for briquets and $0.6 million for packaged fuel. Prices remained stable in 1960; there was no significant change in f.o.b. plant values of either fuel.

[1] Supervisory commodity industry analyst.
[2] Statistical clerk.

TABLE 1.—Salient fuel-briquetting and packaged-fuel statistics

	1947–49 (average)	1957	1958	1959	1960
Fuel briquets:					
United States:					
Production .... short tons..	2,901,348	1,104,781	1,035,261	866,120	744,385
Value	$31,805,000	$14,802,033	$13,697,169	$12,026,319	$10,429,809
Average per ton, f.o.b. plant	$10.96	$13.40	$13.23	$13.89	$14.01
Imports [1] .... short tons..	360	850	184	185	6,676
Exports [1] .... do....	207,928	86,464	54,961	33,458	21,126
Consumption, apparent [2] short tons..	2,693,780	1,019,167	980,484	832,847	729,935
World production .... do....	62,000,000	[3] 121,000,000	[3] 117,600,000	[3] 114,600,000	118,300,000
Packaged fuel:					
United States:					
Production .... short tons..	155,281	47,287	35,769	33,715	24,706
Value	$2,618,238	$1,022,262	$828,116	$790,785	$579,217
Average per ton, f.o.b. plant	$16.86	$21.62	$23.15	$23.45	$23.44

[1] Compiled from records of the U.S. Department of Commerce. Excludes exports of briquets made from petroleum coke and residual carbon from manufacturing oil gas.
[2] Production plus imports minus exports. Import and export data do not include briquets made from petroleum products.
[3] Revised figure.

Foreign trade was insignificant; only 21,126 tons of briquets was exported and 6,676 tons imported. No packaged fuel was shipped to or received from foreign countries.

SCOPE OF REPORT

Only processed fuels of mineral origin are included in this report. Specifically excluded are briquets made from nutshell and wood charcoal.

Fuel briquets are compressed solid-fuel fines, usually made in pillow-shaped form. They are 2 to 4 inches in length, weigh from 2 to 4 ounces, and do not deteriorate outdoors as they are made with a water-insoluble binder. As they do not break easily they are handled as bulk fuel. Briquet plants are comparatively large and generally are located at mines or docks where fines accumulate.

Packaged fuel also is made from fine-sized solid fuels. The fines are compressed into 3- or 4-inch cubes, six or eight of which are wrapped in heavy kraft paper to form a package weighing 10 to 15 pounds. Packaged fuel breaks more easily than briquets and must be stored indoors because it deteriorates when exposed to the weather. Unlike most briquet plants, packaged-fuel plants are small and are used chiefly for salvaging fine-sized fuels that accumulate in coalyards.

Data on the fuel-briquet industry have been published annually since 1907, except in 1910 when no survey was conducted. Packaged-fuel statistics have been published annually since 1935. All data, except where noted, were based upon voluntary reports from producers. Complete coverage of the industries was attempted and, as far as could be determined, all known producers were canvassed.

Questionnaires were mailed to 16 briquet plants; 14 reported production, 1 was abandoned, and 1 was idle. The abandoned plant was in Illinois and the idle plant was an experimental plant in Minnesota. All plants that reported production in 1960 also were active in 1959.

Thirty plants were canvassed for packaged-fuel production and questionnaires were returned by 24. Nineteen reported production, 6 did not reply, and 5 reported that they were either idle or abandoned.

The average of the 3-year period (1947–49) was used as a base for measuring production and consumption trends. All quantities were shown in short tons and the values assigned to production were based upon reported average sales values, f.o.b. plant.

Some data were shown by regions rather than States to avoid revealing individual plant data in States with a small number of producing companies. For briquets, the producing States in each region are: Eastern—West Virginia; Central—Indiana, Michigan, and Wisconsin; Western—Arkansas, Missouri, and North Dakota. For packaged fuel the States and regions are: Eastern—Ohio and Virginia; Central—Illinois, Indiana, Michigan, and Wisconsin; Western—Minnesota.

Data on stocks are not collected as briquets and packaged fuel generally are sold as produced. There usually is a small difference between production and sales, however, as small quantities are used by some producers or sold in the following year.

The capacities of plants as shown in this report include only those plants that were active and reported production. These plants, however, account for virtually the entire capacity of the industries.

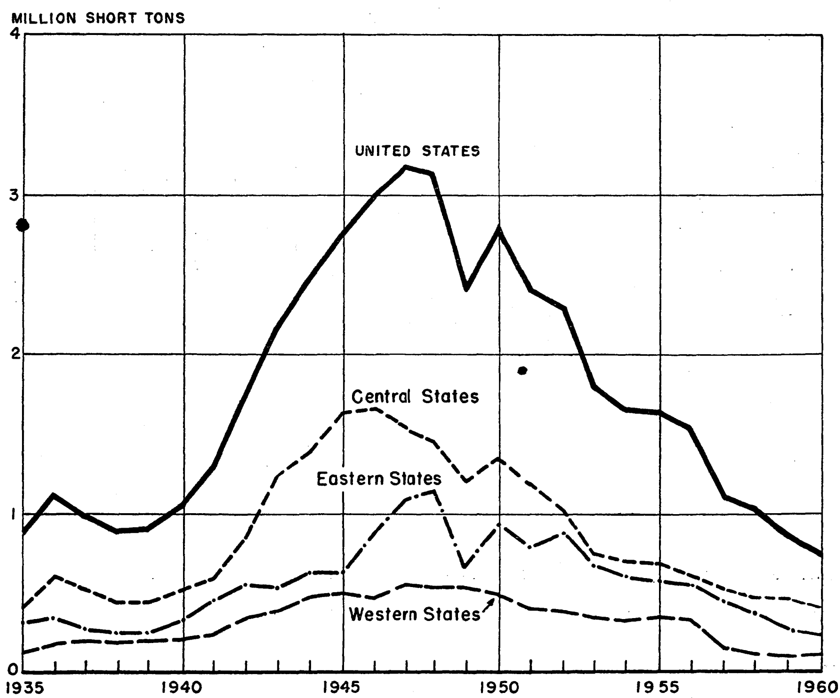

FIGURE 1.—Production of fuel briquets in the United States, 1935–60, by regions.

FUEL BRIQUETS

CAPACITY

Productive capacity of the briquet industry decreased 11 percent in 1960 as one large briquet plant was abandoned and 3 other plants lowered their capacities by substantial amounts. One small plant, however, increased its capacity 50 percent. Plant capacities ranged from 40,000 to 600,000 tons, but about two-thirds of the plants were smaller than 200,000 tons. Operating rates continued to decline, and output of the industry was less than one-third of what it was capable of producing. Table 2 shows the annual capacity and production of briquet plants in the United States, 1956–60.

PRODUCTION

Production decreased 14 percent because one company discontinued operations and all but two operating plants had smaller output than in 1959. During the past decade demand for briquets has declined steadily, and production currently is only about one-fourth as great as in the base years, 1947–49.

TABLE 2.—Annual capacity and production of briquetting plants in the United States

	Active plants	Annual capacity (short tons)	Production	
			Short tons	Percent of capacity
1956	21	3,716,000	1,518,540	40.9
1957	17	3,088,000	1,104,781	35.8
1958	16	3,018,000	1,035,261	34.3
1959	15	2,955,500	866,120	29.3
1960:				
Plants with capacity of—				
Less than 25,000 tons				
25,000 to less than 100,000 tons	5	237,000	74,365	31.4
100,000 to less than 200,000 tons	4	447,500	185,481	41.4
200,000 to less than 400,000 tons	2	(1)	(1)	(1)
400,000 or more tons	3	1,940,000	484,539	25.0
Total	14	2,624,500	744,385	28.4
Plants with production of—				
Less than 5,000 tons	1	(2)	(2)	(2)
5,000 to less than 10,000 tons	1	(2)	(2)	(2)
10,000 to less than 25,000 tons	3	195,000	64,888	33.3
25,000 to less than 100,000 tons	8	1,939,500	468,285	24.1
100,000 or more tons	1	490,000	211,212	43.1
Total	14	2,624,500	744,385	28.4

[1] Included with "400,000 or more tons" to avoid disclosing individual company figures.
[2] Included with "100,000 or more tons" to avoid disclosing individual company figures.

Fourteen plants in seven States produced briquets; but three-fourths of the total production came from West Virginia and Wisconsin. Wisconsin had the largest output and also the largest number of briquet operations. All plants in Wisconsin were in the northern and eastern Lake Dock areas. West Virginia had two plants, located in the southwest mining districts of McDowell and Wyoming counties.

One operation, however, was abandoned after producing for 5 months in 1960. Other producing States listed in order of output were Missouri, Michigan, North Dakota, Indiana, and Arkansas. The briquet plant of the Coal Processing Corporation at Buckner, Ill., was abandoned in 1959 and did not produce any briquets in 1960.

Table 3 shows briquet production and value and the number of active plants in 1960. Production is shown by regions because all States except Wisconsin had less than three producers. Wisconsin had four producing companies and six briquet operations.

Because briquets are used chiefly for space heating and sold as produced, production was seasonal, ranging from 96,750 tons in December to 17,738 tons in July. Production by months is shown in table 4.

TABLE 3.—Production and value of fuel briquets in the United States, by regions

Region	1959				1960			
	Active plants	Production (short tons)	Value		Active plants	Production (short tons)	Value	
			Total	Average			Total	Average
Eastern States	2	(1)	(1)	(1)	2	(1)	(1)	(1)
Central States	9	750,129	$10,279,633	$13.70	8	636,986	$8,843,665	$13.88
Western States	4	115,991	1,746,686	15.06	4	107,399	1,586,144	14.77
Total	15	866,120	12,026,319	13.89	14	744,385	10,429,809	14.01

[1] Included with "Central States" to avoid disclosing individual company figures.

TABLE 4.—Production of fuel briquets in the United States in 1960, by months

Month	Short tons	Month	Short tons	Month	Short tons
January	93,880	May	44,076	September	62,685
February	71,274	June	43,567	October	91,882
March	71,495	July	17,738	November	90,290
April	30,829	August	29,919	December	96,750

Raw Fuels.—Briquets were manufactured from eight different fuels, but almost two-thirds of the total was low-volatile bituminous coal. Other fuels, in order of quantities consumed, were petroleum coke, Pennsylvania anthracite, high-volatile bituminous coal, lignite char, semianthracite, bituminous coke, and other anthracite. Of the total fuels, 64 percent was low-volatile bituminous; 23 percent, petroleum coke; and 4 percent, Pennsylvania anthracite. One-fifth of the fuels was screenings from coalyards; the remainder was supplied, chiefly, by mines and unloading docks. All but four plants used more than one type of fuel. In most instances, two or more fuels were mixed to produce briquets.

The value per ton for raw fuels remained about the same as in 1959, averaging $8.51. This was about four-fifths the average value per ton of all raw materials and about three-fifths the average value per ton assigned to the briquets produced. Pennsylvania anthracite was the most expensive fuel with an average value of $10.54 per ton.

Table 5 shows the raw fuels used for making briquets in 1960.

Binders.—Petroleum asphalt was used exclusively as a briquet binder by all plants but one in 1960. This plant used coal-tar pitch in addition to asphalt. Asphalt was preferred because it has good cohesive properties, is relatively low in cost, is insoluble in water, and has a

TABLE 5.—Raw fuels used in making fuel briquets in the United States in 1960

Type	Number of plants	Used		
		Short tons	Value	
			Total	Average
Anthracite:				
Pennsylvania	4	31,455	$331,640	$10.54
Other than Pennsylvania	1	(1)	(1)	(1)
Semianthracite	2	(1)	(1)	(1)
Bituminous coal:				
Low-volatile	11	453,864	3,734,091	8.23
High-volatile	2	(1)	(1)	(1)
Petroleum coke	9	158,911	1,494,718	9.41
Coke	2	(1)	(1)	(1)
Lignite char	1	(1)	(1)	(1)
Undistributed		61,114	438,568	7.18
Total	[2] 14	705,344	5,999,017	8.51

[1] Included with "Undistributed" to avoid disclosing individual company figures.
[2] Some plants used more than 1 type of raw fuel; hence, the number of plants exceeds the total shown.

TABLE 6.—Quantity and value of raw materials used in making fuel briquets in the United States and quantity and value of sales in 1960, by regions

Region	Raw materials used					
	Fuels			Binders [1]		
	Short tons	Value		Short tons	Value	
		Total	Average		Total	Average
Eastern States	(2)	(2)	(2)	(2)	(2)	(2)
Central States	605,698	$5,284,665	$8.72	42,109	$1,192,190	$28.31
Western States	99,646	714,352	7.17	9,712	228,995	23.58
Total	705,344	5,999,017	8.51	51,821	1,421,185	27.42

Region	Total raw materials			Fuel briquets sold		
	Short tons	Value		Short tons	Value	
		Total	Average		Total	Average
Eastern States	(2)	(2)	(2)	(2)	(2)	(2)
Central States	647,807	$6,476,855	$10.00	639,100	$8,874,968	$13.89
Western States	109,358	943,347	8.63	105,293	1,555,516	14.77
Total	757,165	7,420,202	9.80	744,393	10,430,484	14.01

[1] Includes 484 tons of spray oil used by 2 plants for dustproofing briquets.
[2] Included with "Central States" to avoid disclosing individual company figures.

low ash content. Binders generally constitute 6 to 8 percent of the total raw materials (excluding water), and in 1960 an average of 147 pounds of binder was used for each ton of raw fuel. In addition to binder, a small quantity of spray oil was used by two plants. This was included under binders in table 6, although it was not actually a binding material (it was sprayed on finished briquets, chiefly for dustproofing).

The average value per ton for all binders consumed in 1960 (including spray oil) was $27.42. On the basis of cost per ton of production, the average value of the binder used in manufacturing each ton of briquets was about $1.90. This was about one-fifth the value of the total raw materials used for each ton and about one-eighth the average f.o.b. plant value of briquets sold.

SHIPMENTS

Briquets were distributed in 30 States and exported to 8 foreign countries in 1960. The quantities consumed in individual States varied extensively, however, ranging from only 39 tons in Montana to nearly 149,000 tons in Wisconsin. The terms "consumption" and "distribution" were used synonymously in this report as it was assumed that briquets were used in the States shipped by producers.

Wisconsin was the chief consumer, using about one-fifth of all briquets sold. Wisconsin shipped more than half its production, however, to eight other States, chiefly Minnesota, North Dakota, and South Dakota. West Virginia, the second largest producer, shipped virtually all production to 22 other States and Canada.

Michigan was second in briquet consumption, receiving about 15 percent of the domestic shipments. Minnesota, Missouri, and Indiana followed receiving 12, 10, and 8 percent, respectively, of the total shipments. Minnesota was the largest nonproducing consumer. The other producing States, except Michigan, made most of the briquets they consumed.

About three-fourths of the shipments went by rail. The type of transportation varied with the producing regions, however. Most of the briquets produced in the Eastern and Central States were shipped to destinations too distant for practical delivery by truck. Briquets produced in the Western States were shipped chiefly by truck as they were consumed largely within the producing State or nearby.

Only 13,000 tons of briquets were exported by producers. Bureau of Mines data on exports as shown in table 7 differ from that compiled by the Bureau of the Census (table 9) because some briquets shipped by producers to certain States eventually were shipped to foreign countries by export firms in those States. Also, briquets made from petroleum coke were included in the Bureau of Mines data whereas the Bureau of the Census excluded them.

Except for a few hundred tons packaged in bags and cartons, all briquets were shipped and sold in bulk. Shipments by States of origin were not shown because of the small number of producing companies.

Tables 7 and 8 show the destination of briquet shipments and mode of transportation used.

TABLE 7.—Destination of shipments of fuel briquets [1]

(Short tons)

Destination	1959	1960	Destination	1959	1960
Arkansas	1,107	821	North Carolina	25,297	22,929
California	1,000	120	North Dakota	40,532	39,217
Connecticut		45	Ohio	49,835	42,173
Florida	47	101	Pennsylvania	371	299
Illinois	43,188	30,224	South Carolina	1,110	1,978
Indiana	77,088	61,012	South Dakota	32,351	33,586
Iowa	28,945	25,305	Tennessee	916	689
Kansas	5,606	7,053	Texas	39	
Kentucky	3,413	3,018	Vermont		48
Maine	115	145	Virginia	32,286	36,729
Maryland	849	1,262	Washington	1,574	1,204
Massachusetts	101	505	West Virginia	408	882
Michigan	118,413	106,639	Wisconsin	178,378	148,989
Minnesota	92,419	87,089			
Missouri	89,744	72,952	Total	830,926	731,192
Montana		39	Exported	27,662	13,201
Nebraska	5,696	6,089			
New Hampshire		50	Grand total	858,588	744,393
New York	98				

[1] Based upon reports from producers showing destination of briquets used or sold.

TABLE 8.—Shipments of fuel briquets in the United States, by methods of transportation [1]

(Short tons)

Origin	1959			1960		
	Rail	Truck [2]	Total	Rail	Truck [2]	Total
Eastern States	283,123	166	283,289	232,140	145	232,285
Central States	320,759	136,988	457,747	283,959	122,856	406,815
Western States	41,338	76,214	117,552	33,239	72,054	105,293
Total	645,220	213,368	[3] 858,588	549,338	195,055	[3] 744,393

[1] Includes shipments destined for export as reported by producers directly to the Bureau of Mines.
[2] Includes small quantity shipped by barge.
[3] An additional 2,110 tons was used by 1 producer in 1959 as fuel and 541 tons by 2 producers in 1960.

VALUE AND PRICE

The total value of briquet production in 1960 was approximately $10.4 million. This value was calculated by multiplying total output by the average receipts per ton, f.o.b. plant, as reported by producers. Production and sales values were virtually the same as most briquets produced also were sold in 1960.

The average value per ton for all briquets sold was $14.01. Briquets made in the Eastern States had a lower unit value than those of other regions because the Eastern plants were near the source of their raw fuels. The briquets generally were shipped farther than those of other regions, however, and additional costs for transportation approximated the cost of raw fuels in other areas. Hence, retail prices were essentially competitive.

FOREIGN TRADE [3]

Foreign trade was small in 1960 with only 3 percent of the production exported and 6,676 tons imported.

Briquet exports have declined substantially during the past decade. Canada remained the principal export market receiving 19,403 tons, or about nine-tenths of the foreign shipments. Small quantities were shipped to 7 other countries.

Imports increased greatly in 1960, reaching their highest point since 1938. About four-fifths of the 6,676 tons imported were made in Can-

TABLE 9.—Fuel briquets (coal and coke) exported from the United States, by countries of destination and customs districts

	1958		1959		1960	
	Short tons	Value	Short tons	Value	Short tons	Value
COUNTRY						
North America:						
British Honduras	---	---	100	$2,550	---	---
Canada	53,311	$867,662	33,358	492,728	19,403	$279,458
Guatemala	50	1,270	---	---	---	---
Mexico	62	3,042	---	---	244	2,916
Trinidad and Tobago	---	---	---	---	457	7,240
Total	53,423	871,974	33,458	495,278	20,104	289,614
South America:						
Brazil	1,538	26,915	---	---	---	---
Venezuela	---	---	---	---	10	1,255
Total	1,538	26,915	---	---	10	1,255
Asia:						
Japan	---	---	---	---	393	5,291
Pakistan	---	---	---	---	258	3,281
Thailand	---	---	---	---	20	450
Total	---	---	---	---	671	9,022
Africa: Congo, Republic of	---	---	---	---	341	5,524
Grand total	54,961	898,889	33,458	495,278	21,126	305,415
CUSTOMS DISTRICT						
Arizona	36	360	---	---	68	1,026
Buffalo	22,408	395,409	1,825	31,357	2,078	29,686
Dakota	10,463	153,886	12,770	174,903	6,680	103,175
Duluth and Superior	9,738	142,864	9,023	141,056	5,177	81,395
Galveston	26	2,682	---	---	278	3,731
Laredo	---	---	---	---	172	1,650
Michigan	2,872	35,444	5,979	77,707	5,418	64,610
Minnesota	50	575	50	806	---	---
New Orleans	---	---	---	---	10	1,255
New York	---	---	---	---	341	5,524
Ohio	---	---	892	12,211	---	---
Philadelphia	1,538	26,915	---	---	---	---
St. Lawrence	7,350	134,604	2,429	49,898	---	---
San Diego	---	---	---	---	4	240
San Francisco	---	---	---	---	393	5,291
Vermont	---	---	---	---	50	592
Virginia	---	---	---	---	457	7,240
Other	[1] 480	[1] 6,150	[1] 490	[1] 7,340	---	---
Total	54,961	898,889	33,458	495,278	21,126	305,415

[1] Estimated from sample data; district data not available.

Source: Bureau of the Census.

[3] 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.

TABLE 10.—Fuel briquets (coal and coke) imported, by countries and customs districts

Country and customs district	1958		1959		1960	
	Short tons	Value	Short tons	Value	Short tons	Value
Canada:						
Buffalo					1,090	$14,558
Dakota					1,735	170,102
Michigan					60	777
Montana and Idaho					1,533	41,348
Washington	184	$2,174	179	$2,162	1,249	113,615
Total	184	2,174	179	2,162	5,667	340,400
Japan:						
Los Angeles					410	22,313
New York					7	36
San Francisco					591	26,396
Total					1,008	48,745
Netherlands: Chicago					1	331
United Kingdom: Maryland			6	437		
Grand total	184	2,174	185	2,599	6,676	389,476

Source: Bureau of the Census.

ada, chiefly from lignite char; the remainder was coke briquets shipped from Japan.

Imported briquets had a much higher unit value than that of domestic briquets, but the values are not comparable as they were at different marketing levels. Also, a large part of the imported briquets was sold in small packages by the pound whereas most domestic briquets were sold in bulk by the ton.

Import data as shown in table 10 were compiled from records of the Bureau of the Census and include only briquets made from coal and coke.

TECHNOLOGY

Considerable research has been directed in recent years toward the development of briquets suitable for use as metallurgical fuel. Several factors have stimulated research in this direction; the most important, however, are that briquetting processes offer a lower investment cost per ton of product and such processes can use nonmetallurgical grade coal, which is generally available. They also produce coke that is uniform in size and quality.

Experimental work by Consolidation Coal Company, Pittsburgh, Pa., has led to the development of a product called Formcoke. Formcoke is a fuel of metallurgical grade, made by briquetting mixtures of low-temperature char, coal, and pitch binder with commercial briquetting machinery. Briquets then are coked in a continuous process in which they are subjected to shock heating to prevent plastic deformation during carbonization. Too severe heating causes briquets to fracture, however, and more recent studies[4] by Consolidation Coal Company have developed data on the heat transfer and thermal stresses that occur in briquets during carbonization. These were cal-

[4] Yavorsky, P. M., Friedrich, R. J., and Gorin, E., Heat Transfer and Thermal Stresses in Carbonization of Briquets: Ind. and Eng. Chem., vol. 51, No. 7, July 1959, pp. 838–883.

culated by employing a digital computer which made possible the accurate prediction of heat transfer rates and temperature distribution patterns within spherical, shock-heated briquets up to 2 inches in diameter.

Another coking process based on briquetting[5] has been developed by Food Machinery Corporation and United States Steel Corporation. Details of the process have not been made public, but it is understood that low-grade coals are reduced in a retort or preheat chamber after which the semicoke or char is briquetted mechanically without binder. Briquets then are reduced to coke in another unit. It is expected that this coke, which is metallurgical grade, will be produced in two sizes—small briquets of about 7/8-inch for use in elemental phosphorus plants and large briquets, up to 3 inches, for blast furnaces. A $3.5 million pilot plant for making coke by this process has been built and currently is in operation at Kemmerer, Wyo.

Studies[6] of carbonized briquets made from anthrafines and pitch binders showed that several factors directly influence briquet strength. It was determined that increased amounts of pitch gave increased strength, up to a maximum amount, equivalent to that required to maintain void volume above 15 percent in the compressed raw briquet. The most important property of binders for imparting strength to carbonized briquets appeared to be the quantity of binder left in the briquet upon carbonizing. The best binders produced the most volume shrinkage during carbonization and the highest density carbonized briquets. In general, coal tar pitches imparted these properties to a greater degree than petroleum pitches of similar softening points. The most effective pitch component for high strength appeared to be the more insoluble pitch fractions. Other factors such as briquetting pressure, carbonization temperature and rate, and heat treatment of coal before briquetting also were explored and determinations were made of their effect on briquet strength.

PACKAGED FUEL

CAPACITY

Productive capacity of the packaged-fuel industry decreased 11 percent in 1960 as two plants were abandoned and one small plant that operated in 1959 did not respond to our canvass and was assumed to be idle. Several active plants also reported lower capacities than in 1959, but this was offset by one new plant that first reported production in 1960. As with briquets, this industry also has declined in the past decade and current capacity is less than one-third that of the base years while active plants have decreased from 60 to 19. This industry has more plants than the briquet industry but is less than one-twentieth the size and had an annual productive capacity in 1960 of only 123,000 tons. Most of the plants are small; 14 of the active plants had capacities of less than 5,000 tons and only 1 plant had a capacity greater than 25,000 tons.

[5] New Coking Methods Shorten West's Raw Material Supply Lines, Chem. Week: Jan. 16, 1960, pp. 40–42.

[6] Gillmore, D. W., Wright, C. C., and Kinney, C. R., Factors Influencing the Strength of Carbonized Briquets Prepared from Anthrafines and Pitch Binders: Jour. Inst. Fuel, vol. 32, No. 217, February 1959, pp. 50–56.

Operating rates continued to decline; the industry produced only about one-fifth the quantity of packaged fuel that it was capable of producing. The average rate of operation was 4.3 points lower than in 1959.

Annual capacity and production of active packaged-fuel plants in the United States, 1956–60, are shown in table 11.

TABLE 11.—Annual capacity and production of packaged-fuel plants in the United States

	Active plants	Annual capacity (short tons)	Production	
			Short tons	Percent of capacity
1956	26	174,600	64,960	37.2
1957	23	150,200	47,287	31.5
1958	23	141,800	35,769	25.2
1959	21	138,100	33,715	24.4
1960:				
Plants with capacity of—				
Less than 5,000 tons	14	27,200	4,335	15.9
5,000 to less than 10,000 tons	2	13,800	1,347	9.8
10.000 to less than 15,000 tons	1	[1] 82,000	[1] 19,024	[1] 23.2
15,000 to less than 25,000 tons	1			
25,000 or more tons	1			
Total	19	123,000	24,706	20.1
Plants with production of—				
Less than 1,000 tons	16	41,000	5,682	13.9
1,000 to less than 3,000 tons	1	[1] 82,000	[1] 19,024	[1] 23.2
3,000 to less than 5,000 tons	1			
5,000 to less than 10,000 tons				
10,000 or more tons	1			
Total	19	123,000	24,706	20.1

[1] Combined to avoid disclosing individual company figures.

PRODUCTION

Production decreased 27 percent partly because there were two less producers than in the preceding year. However, most active plants also produced less packaged fuel than in 1959. Total output was about one-sixth as large as in the base years (1947–49).

Nineteen plants in seven States reported production. Michigan was the largest producer with about one-half of the total. Wisconsin and Indiana produced most of the remainder. Michigan and Ohio had the largest number of operations; however, the largest plants were in Michigan and Wisconsin. Data on production by States are shown in table 12.

Packaged fuel usually is sold as produced. As it was used chiefly for domestic heating, demand was seasonal and production ranged from 3,854 tons in January to 151 tons in July (table 13).

Slightly less packaged fuel was produced than the total raw materials consumed because of breakage and other minor losses. (See table 14).

TABLE 12.—Production and value of packaged fuel in the United States, by States

State	1959				1960			
	Active plants	Production (short tons)	Value		Active plants	Production (short tons)	Value	
			Total	Average			Total	Average
Indiana	3	4,842	$104,324	$21.55	3	4,063	$89,386	$22,00
Michigan	5	16,021	387,838	24,21	5	12,256	294,743	24.05
Ohio	7	3,983	89,088	22.37	5	1,293	28,066	21.71
Other States	[1] 6	8,869	209,535	23.63	[1] 6	7,094	167,022	23.54
Total	21	33,715	790,785	23.45	19	24,706	579,217	23.44

[1] Comprises 2 plants each in Minnesota and Virginia and 1 plant each in Illinois and Wisconsin.

TABLE 13.—Production of packaged fuel in the United States in 1960, by months

Month	Short tons	Month	Short tons	Month	Short tons
January	3,854	May	1,639	September	1,767
February	3,076	June	214	October	2,206
March	2,951	July	151	November	2,652
April	1,939	August	1,375	December	2,882

Raw Fuels.—Except for a small quantity made from petroleum coke, all packaged fuel was manufactured from low-volatile bituminous coal. Sixty-two percent of the raw fuels was yard screenings that had accumulated in coalyards. The remainder came from other sources, chiefly from mines and points where coal was loaded and unloaded. Eleven plants used yard screenings exclusively; five used only other fuels; and three used both yard screenings and other fuels.

The raw fuels consumed averaged $10.28 per ton. This was about 94 percent of the cost per ton for all raw materials.

Binders.—Starch was used as a binder by 18 of the 19 active plants, and 1 plant used petroleum asphalt. Starch was preferred because, although it is relatively expensive, only small quantities were required and binder cost per ton of production was low. There was a large difference in the average value of binders consumed in the Eastern and Central States because one plant in the Central States used asphalt, which had a relatively low value compared to starch. Exact figures on starch binder could not be shown, but approximately 10 pounds of starch worth about $0.65 was used for each ton of packaged fuel produced. For comparison purposes, approximately 138 pounds of asphalt costing about $1.90 was used for manufacturing each ton of fuel briquets in 1960.

The quantity and value of raw materials used for making packaged fuel, as well as data on sales, are shown in table 14.

TABLE 14.—Quantity and value of raw materials used in making packaged fuel in the United States and quantity and value of sales in 1960, by regions

Region	Raw materials used					
	Fuels			Binders		
	Short tons	Value		Short tons	Value	
		Total	Average		Total	Average
Eastern States	2,273	$21,971	$9.67	21	$2,688	$128.00
Central States	22,324	230,969	10.35	418	18,898	45.21
Western States	(1)	(1)	(1)	(1)	(1)	(1)
Total	24,597	252,940	10.28	439	21,586	49.17

Region	Total raw materials			Packaged fuel sold		
	Short tons	Value		Short tons	Value	
		Total	Average		Total	Average
Eastern States	2,294	$24,659	$10.75	2,260	$50,610	$22.39
Central States	22,742	249,867	10.99	22,680	534,346	23.56
Western States	(1)	(1)	(1)	(1)	(1)	(1)
Total	25,036	274,526	10.97	24,940	584,956	23.45

[1] Combined with "Central States" to avoid disclosing individual company figures.

SHIPMENTS

Most packaged fuel was sold locally, although two producers reported sales other than local. All packaged fuel was shipped by truck or picked up by consumers at plants. Sales were slightly higher than production because one producer sold a few hundred tons of packaged fuel made in the previous year. Production kept pace with demand and only one plant sold less packaged fuel than it produced. No packaged fuel has been shipped by rail since 1953. Data on shipments are shown in table 15.

VALUE AND PRICE

The total value of production decreased 27 percent in 1960 because of the decrease in output, but unit values remained about the same. In comparison, total value was about one-fifth that of the base years (1947–49). The value of production was calculated from the reported f.o.b. plant value of commercial sales.

Packaged fuel was sold for an average of $23.45 per ton at plant. This was about two-thirds more than the average value of briquets but the values are not comparable because of differences in the two products and in marketing methods. Because most briquets were sold in bulk for heating, they were competitive in price with other bulk solid fuels. Also, most were sold through wholesale and retail channels and the actual price to the consumer was greater than the f.o.b. plant value. In contrast, packaged fuel is a packaged specialty item

TABLE 15.—Shipments of packaged fuel in the United States, by methods of transportation

(Short tons)

Year	Shipped by truck		
	Local sales	Other than local sales	Total
1956	51,933	11,482	63,415
1957	39,739	7,475	47,214
1958	36,862	(1)	36,862
1959	31,219	(1)	31,219
1960	24,940	(1)	24,940

[1] Combined with "Local sales" to avoid disclosing individual company figures.

that generally was sold in small quantities by producers directly to consumers; the f.o.b. plant value was approximately equal to the retail price.

Packaged fuel produced in Minnesota had the highest assigned value and Ohio the lowest.

WORLD REVIEW

Estimated world production of fuel briquets and other processed mineral solid fuels in 1960 was 118.3 million short tons. This was about a 3-percent increase over 1959 and was due chiefly to larger outputs in East and West Germany and Australia.

Ninety-three percent of all briquets were produced in Europe, chiefly from lignite, but also from bituminous coal and peat. East Germany was the largest producer, manufacturing more than half of the world output. West Germany was second in production with 19 percent of the total. Both countries make large quantities of briquets from brown coal, which is used extensively to supplement supplies of other fuels for residential and industrial heating. Briquet production in the Soviet Union was estimated at 9.4 million tons, about 8 percent of the total. France produced 6.7 million tons, followed by the United Kingdom, Netherlands, Spain, Hungary, and Belgium, each with more than 1 million tons. However, the combined output of these countries was only 11 percent of the world total. Japan and Korea produced 95 percent of the briquets made in Asia. Production in Asia was 5 percent of the world total.

Briquet production in Australia more than doubled as increased quantities of carbonized lignite briquets were produced for metallurgical use. Output in Australia was 1.7 million tons, about 1 percent of the world total.

Smaller quantities of briquets were produced in 12 other European countries, Canada, Indonesia, Pakistan, Turkey, South Vietnam, Algeria, Morocco, Tunisia, New Zealand, and Peru. The United States, with 0.8 million tons, had less than 1 percent of the world production.

TABLE 16.—World production of fuel briquets and packaged fuel, by countries [1]

(Thousand short tons)

Country	1956	1957	1958	1959	1960
North America:					
Canada	753	395	204	153	[2] 140
United States:					
Briquets	1,519	1,105	1,035	866	744
Packaged fuel	65	47	36	34	25
Total	2,337	1,547	1,275	1,053	909
South America: Peru	3	18	9	4	[2] 6
Europe:					
Austria	8	13	2	----------	----------
Belgium	2,014	2,023	1,143	1,105	1,185
Bulgaria [2]	255	255	275	275	275
Czechoslovakia:					
Bituminous	324	365	[2] 370	[2] 370	[2] 380
Lignite	348	340	[2] 340	[2] 340	[2] 360
Denmark	94	107	83	[2] 70	[2] 70
Finland	[2] 11	[2] 11	13	15	[2] 17
France	8,706	9,101	7,813	7,232	6,695
Germany:					
East, lignite	56,917	58,826	59,534	59,578	61,781
West:					
Anthracite and bituminous	8,497	8,624	6,209	5,192	5,753
Lignite	18,693	18,547	18,119	16,761	16,805
Hungary	724	804	1,046	1,157	[2] 1,200
Ireland	54	37	42	44	[2] 44
Italy, anthracite	28	18	12	26	29
Netherlands:					
Anthracite and bituminous	1,139	1,259	1,197	1,168	1,302
Lignite	86	89	83	71	69
Poland:					
Bituminous	714	732	707	751	[2] 770
Lignite	206	257	303	[2] 325	[2] 330
Portugal	112	100	83	66	[2] 60
Rumania [2]	285	300	300	305	330
Spain	1,427	1,523	1,580	1,408	[2] 1,320
Sweden	71	77	69	[2] 65	[2] 65
Switzerland [2]	110	110	110	110	110
U.S.S.R. [2]	9,400	9,400	9,400	9,400	9,400
United Kingdom	1,990	2,359	2,463	1,926	[2] 1,650
Yugoslavia	28	8	19	18	[2] 20
Total [2]	112,200	115,300	111,300	107,800	110,000
Asia:					
Indonesia	25	37	32	11	[2] 11
Japan	[2] 2,980	2,567	[2] 2,540	[2] 2,480	[2] 2,860
Korea, Republic of	535	583	1,450	[2] 2,200	2,455
Pakistan [2]	13	13	13	17	17
Turkey	75	65	128	131	[2] 165
Vietnam, South [2]	55	55	55	61	60
Total	[2] 3,680	3,320	[2] 4,220	[2] 4,900	[2] 5,570
Africa:					
Algeria	34	47	56	54	[2] 55
Morocco: Southern Zone	19	21	20	22	25
Tunisia	4	6	2	[2] 6	[2] 5
Total	57	74	78	82	[2] 85
Oceania:					
Australia	692	694	723	753	1,668
New Zealand	18	18	19	18	[2] 17
Total	710	712	742	771	1,685
World total [2]	119,000	121,000	117,600	114,600	118,300

[1] Includes briquets made from coal, lignite, and peat and revisions of data published previously. Data do not add to totals shown owing to rounding.
[2] Estimated.

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

Peat

By Eugene T. Sheridan [1] and Virginia C. Berté [2]

Contents

GENERAL SUMMARY

PEAT PRODUCTION in the United States continued to increase in 1960 as total output reached 470,889 tons. This quantity was 12 percent more than was produced in 1959 and nearly four times that of 1947–49. The decrease of 8 percent in imports was offset by greater domestic output. More peat was available for consumption in 1960 than in any previous year.

There were 114 commercial producers of peat operating in 21 States. Michigan led with 32 operations; Ohio and Washington ranked next with 13 each. The leading producing States, however, were Michigan, Florida, and California, with 46, 8, and 7 percent, respectively, of the total output.

Fourteen percent of the production was reported as moss peat; 52 percent, reed-sedge peat; and the remainder, peat humus. Sixteen percent of the total was raw, sold as excavated except for air-drying. Eighty-four percent was processed by shredding, pulverizing, and/or kiln-drying. About three-eighths of the production was cultivated at 28 operations before it was excavated.

Ninety-four percent of all peat sold was used for soil improvement; 4 percent was sold for potting soils and for packing flowers; and the remainder was used for earthworm culture, preparing golf course greens, mixed fertilizers, mushroom beds, seed inoculant, and seed beds. No peat was sold for use as fuel or for energy purposes.

Domestic peat was distributed in 46 States and the District of Columbia, and a small quantity was exported to Canada. About

[1] Supervisory commodity-industry analyst.
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five-eighths of the total sales were in bulk, however, and sold chiefly within the State where produced.

Total domestic production was valued at $5.1 million, about 18 percent more than in 1959. The average unit value of all peat produced also increased over the preceding year.

Salient peat statistics are shown in table 1.

TABLE 1.—Salient peat statistics

	1947–49 (average)	1957	1958	1959	1960
United States:					
Number of operations	45	76	81	105	115
Production short tons	131,782	316,217	327,813	419,460	470,889
Value	$939,518	$3,458,459	$3,445,767	$4,372,194	$5,138,331
Average per ton	$7.13	$10.94	$10.51	$10.42	$10.91
Imports [1] short tons	88,462	246,759	269,096	286,719	263,877
Available for consumption [2] do	220,244	562,976	596,909	706,179	734,766
World production do	50,000,000	[3] 70,600,000	[3] 64,700,000	[3] 76,700,000	75,700,000

[1] Compiled from records of the U.S. Department of Commerce.
[2] Production plus imports.
[3] Revised figure.

GOVERNMENT REGULATIONS

No national standards have been established for the various grades and types of peat. Marketing of peat in the United States, however, is regulated by trade practice rules that were established by the Federal Trade Commission to promote fair competitive practices within the peat industry in the labeling and sale of peat. In general, the rules forbid unfair or deceptive practices in marketing, making misrepresentations, and using deceptive trade or corporate names. They give the requirements for labeling a product "peat" and state the manner in which the terms "peat moss" and "moss peat" may be used. Peat is defined as any partly decomposed vegetable matter that has accumulated under water or in a water-saturated environment. It is unlawful to designate a product "peat" unless it contains 75 percent peat, as defined above, on a dry-weight basis, and the remainder is composed of normally associated soil materials. A material labeled "moss peat" must contain at least 75 percent peat that was derived from sphagnum, hypnum, mnium, and/or other mosses; the remainder must consist of other peat or soil substances normally intermixed with peat in its natural state. The label "peat moss" may be used without these qualifications if the requirements for "peat" are fulfilled and the kind or kinds of peat of which the product is composed are conspicuously stated in immediate conjunction with the term "peat moss".

The trade-practice rules also prohibit certain discriminatory practices in pricing, brokerage and commissions; advertising or promotional allowances; and allowances for services and facilities. To further protect the public and to assist consumers in using the various kinds of peat, the rules suggest that producers voluntarily disclose such properties as moisture content, acid and ash content, moisture holding capacity, and degree of decomposition. They also recommend that the principal uses for which the product is suitable be furnished, particularly when peat is packaged.

The Federal Supply Service, General Services Administration, in conjunction with the U.S. Department of Agriculture has developed specifications for use by government agencies that purchase peat. Interim Federal Specification Q-P-00166d(AGR-ARS), June 20, 1960, classifies peat and lists requirements for each type and class. It also supplies pertinent information on sampling, inspection, and testing procedures; packaging and marking requirements; and other related facts.

SCOPE OF REPORT

This 27th annual report on the peat industry is based on a survey that has been continuous since 1934, when the Bureau of Mines resumed the canvass of the industry conducted by the Federal Geological Survey from 1908 to 1926. No data were collected or published between 1926 and 1934.

All data, except where noted, were based upon reports supplied voluntarily by producers. Complete coverage of the industry was attempted and questionnaires were mailed to all producers who had reported commercial production within the past 3 years. Questionnaires were also mailed to all firms and individuals who were reported to be possible producers. Mailing lists are kept current by requesting producers to furnish names and addresses of other peat operations in their areas and by checking State mineral and commodity reports. Of the 156 questionnaires sent for 1960, 114 companies reported production at 115 operations; 12 were temporarily idle; 9 were abandoned; and 20 did not reply or stated that they did not produce peat. Of the companies that did not reply, two reported production in 1959, but their combined output was only a few hundred tons. No estimates of production were made for nonreporting companies. Because of the nature of the peat industry in the United States, this survey may have failed to reach all producers. The authors feel, however, that all major and most of the smaller producers were canvassed, and that the production figures include most of the peat produced commercially in the United States.

Peat is classified in this report into three general types—moss peat, reed-sedge peat, and peat humus. Moss peat is a type which has been formed principally from sphagnum, hypnum, and/or other mosses. It is only slightly or moderately decomposed and is normally acid in reaction. Reed-sedge peat consists chiefly of the moderately decomposed remains of swamp plants such as reeds and sedges and other vegetable matter that originated in a water-saturated environment; it is slightly acid, neutral, or alkaline in reaction. Humus is any type of peat, so decomposed that its biological identity is lost. Humus is sometimes called peat muck.

The above classifications are less restrictive than those contained in the Federal Specifications for Peat, but the nature of the domestic peat industry makes it impractical to make them more limiting. In all instances, production and sales data by type or kind of peat have been shown in this report as reported by producers. A few producers reported output of more than one type as some deposits contained layers of different types of peat that were excavated separately by controlling excavating depth. Such deposits usually contained reed-sedge peat that was topped with a thin layer of fibrous moss peat, similar to that imported from Canada and Europe.

Raw peat is that which had no processing other than air-drying. Processed peat was shredded, pulverized, and/or kiln-dried. A small quantity of peat was cultivated, a method of preparation in which the surface layer of a deposit is turned over periodically before peat is excavated. (Cultivation aerates peat and makes it more humified by exposing the undersurface.)

Data were collected on production, sales, shipments, values, uses, location and size of deposits, and types of equipment used. The data on uses included only peat produced in the United States, as no information was available on the ultimate uses of imported peat. No information was requested on stocks, as peat normally is sold as produced. Peat, however, usually is placed on a stockpile after it is excavated, and production is estimated from the quantities sold. The difference between production and sales, therefore, was the estimated quantity of peat that remained on stockpiles at the end of the year.

All values for domestic peat were based upon producers' selling prices at the operation, exclusive of containers. In a few instances, values were estimated when a producer failed to include the f.o.b. plant value of peat sold.

The terms "consumption" and "distribution" are used synonymously in this report as it was assumed that all peat was used in States where shipped by producers. All quantities, except where noted, are shown in short tons.

RESERVES

The Federal Geological Survey surveyed the peat lands of the United States between 1914 and 1919, and peat resources were estimated at 13.8 billion tons of air-dried peat. These reserves remain virtually intact as less than 0.05 percent of the total has been excavated.

The major peat areas are in the northern and Atlantic Coast regions of the United States. A small quantity (less than 1 percent of the total) also occurs in the Gulf Coast area, in California, and in the basins of several lakes and rivers in Oregon and Washington. The northern region has 80 percent of the total reserves.

Peat occurs in 30 States, but about two-thirds of the total is in Minnesota and Wisconsin. These States are in the northern region, which also includes Michigan, New York, New Jersey, parts of Ohio, Illinois, Indiana, Iowa, Pennsylvania, and the New England States. The Minnesota reserves are estimated at 6.8 billion tons, covering about one-tenth of the total land area. Wisconsin has about 1 million acres of peat land, containing 2.5 billion tons.

The peat deposits of Minnesota and Wisconsin have been formed chiefly by the decomposition of reeds, sedges, and other aquatic plants in basins that formerly were lakes or ponds. In most areas, however, these filled-basin deposits are covered with "built-up" peat, formed by the accumulation of decomposed mosses after the basin deposit was filled to the level of the surrounding countryside. Most of these deposits have live sphagnum moss growing on the surface and a stratum of sphagnum moss peat under the live sphagnum. This stratum is quite thin, however, and except for a few areas, no deposits have been found where sphagnum moss peat is thick enough over an extended area for economic commercial production. The remaining peat in such bogs is chiefly reed-sedge.

The northern peninsula of Michigan has extensive deposits of peat, similar to those of Minnesota and Wisconsin. Peat also occurs in the southern part of Michigan, but these deposits generally are much smaller and consist chiefly of reed-sedge peat.

Deposits in other States of the northern region, excluding New England, were formed chiefly in marshes, ponds, and shallow lakes from reeds, sedges, marsh grasses, and other swamp plants. The northern parts of several States also have some built-up deposits containing an upper layer of moss peat, but in general, mosses did not contribute greatly to peat formation in most of the remaining States of the northern region.

Peat occurs in all New England States, but four-fifths of the reserves in New England is in Maine. The Maine deposits are of two types—the filled basin, with peat similar to that found in Minnesota, and the climbing bog, where peat is formed predominantly from sphagnum moss. Climbing bog deposits are in the flat or gently sloping coastal and inland areas of eastern and southern Maine. This type of bog is common in Ireland and other parts of northwestern Europe. Peat in these bogs is light-colored, fibrous, and relatively homogeneous and is similar to the moss peat imported from Canada and Germany. There are also large deposits in northern and western Maine, but many are in heavily forested swamps and are inaccessible. It is estimated that deposits in Maine contain 100 million tons of air-dried peat.

All States along the Atlantic Coast have peat deposits, but about 75 percent of the estimated 2.7 billion tons of this region is in Florida. Peat is found in all parts of Florida, which ranks third in total reserves. The Dismal Swamp in Virginia and North Carolina is the second largest peat area of the Atlantic Coast region.

Known original reserves of peat in the United States, as reported by the Federal Geological Survey, are shown in table 2.

TABLE 2.—Known original reserves of peat in the United States, estimated on an air-dried basis, by regions and States [1]

(Thousand short tons)

Region and State	Reserves	Region and State	Reserves
Northern region:		Atlantic Coast region:	
Minnesota	6,835,000	Virginia and North Carolina	700,000
Wisconsin	2,500,000	Florida	2,000,000
Michigan	1,000,000	Other States [2]	2,000
Iowa	22,000		
Illinois	10,000	Total	2,702,000
Indiana	13,000		
Ohio	50,000	Other regions:	
Pennsylvania	1,000	Gulf Coast [3]	2,000
New York	480,000	California	72,000
New Jersey	15,000	Oregon and Washington	1,000
Maine	100,000		
New Hampshire	1,000	Total	75,000
Vermont	8,000		
Massachusetts	12,000	Total all regions	13,827,000
Connecticut	2,000		
Rhode Island	1,000		
Total	11,050,000		

[1] Geological Survey, Coal Resources of the United States (Progress Report): Circ. 293, Oct. 1, 1953, p. 38.
[2] Includes Delaware, Maryland, South Carolina, and Georgia.
[3] Excludes Florida.

PRODUCTION

Production of peat continued to rise in 1960, increasing 12 percent over 1959; this output was nearly four times the average quantity produced in 1947–49.

One hundred and fourteen producers reported commercial production at 115 operations—10 more than the number of active plants in 1959. Michigan had 32 operations and the largest production, 46 percent of the total. This was 12 percent more than the preceding year although there were two less plants. Florida and California produced 8 and 7 percent, respectively, of the total, ranking next in output. Florida had seven operations and California had five.

Alaska became a producing State as one producer reported output of several hundred tons of moss peat. Producers in Iowa and Minnesota also reported output in 1960 but not in 1959. Because operations were suspended at two plants, Maine ceased to be a producing State.

Fifty-two percent of the production was reed-sedge peat; 34 percent, humus; and 14 percent, moss peat. Sixteen percent was raw with no preparation other than air-drying outdoors. The remainder was processed by shredding, pulverizing, and/or kiln-drying.

All peat was excavated by machinery which consisted chiefly of conventional types of excavating and earthmoving equipment. These included power shovels, draglines, bulldozers, clamshells, front-end loaders, dredges, trucks, and belt and bucket loaders. It was impossible to determine the quantity of peat excavated by any particular type of equipment because most operations have more than one type of equipment that can be used for excavating.

Peat was cultivated at 28 bogs, and 38 percent of the production was prepared before excavation. It was cultivated chiefly by tractor-drawn disk harrows. Peat was processed by a variety of shredders, grinders, hammermills, and screens. A small quantity of peat was kiln-dried by four producers.

Production of peat in the United States, by kinds and by States, is shown in tables 3 and 4.

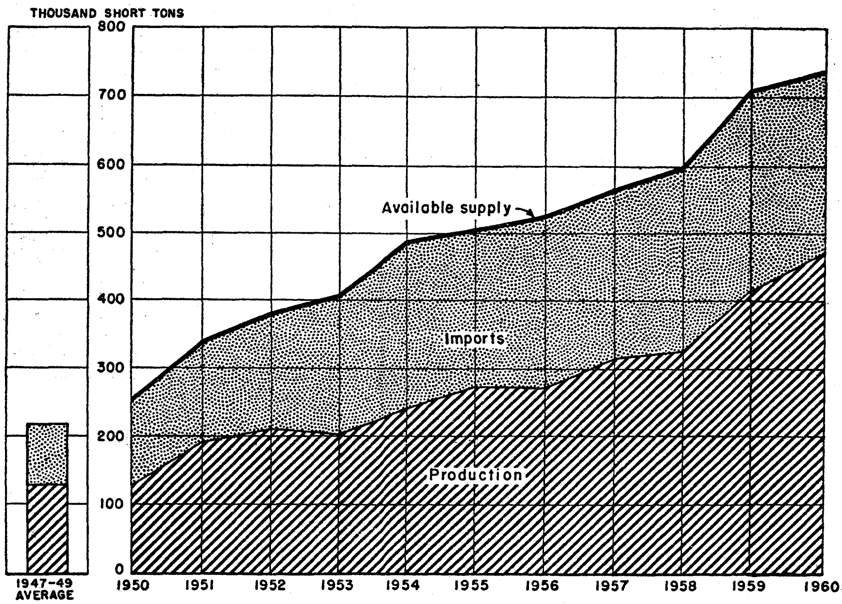

FIGURE 1.—Production, imports, and available supply of peat in the United States, 1950–60.

TABLE 3.—Peat produced in the United States, by States

State	1959			1960		
	Number of operations	Short tons	Value	Number of operations	Short tons	Value
Alaska	----	----	----	1	376	(1)
California	5	34, 604	$448, 533	5	33, 091	$481, 181
Colorado	3	6, 674	35, 488	3	9, 384	37, 542
Connecticut	4	2, 090	13, 105	2	(1)	(1)
Florida	8	34, 446	158, 139	7	39, 275	162, 093
Georgia	2	4, 288	(1)	3	6, 904	73, 578
Idaho	1	(1)	(1)	2	(1)	(1)
Illinois	4	9, 117	71, 544	3	6, 179	27, 947
Indiana	5	15, 393	202, 094	7	27, 486	290, 338
Iowa	----	----	----	2	(1)	(1)
Maine	2	(1)	(1)	----	----	----
Massachusetts	1	773	(1)	1	(1)	(1)
Michigan	34	191, 661	2, 356, 656	32	214, 402	2, 755, 245
Minnesota	----	----	----	5	1, 465	72, 393
New Hampshire	1	25	(1)	1	23	(1)
New Jersey	3	28, 300	277, 920	4	25, 100	191, 580
New York	3	12, 875	138, 220	3	10, 042	145, 628
Ohio	11	5, 813	73, 270	13	6, 755	92, 848
Pennsylvania	6	26, 948	261, 994	6	30, 837	324, 557
South Carolina	1	4, 194	(1)	1	(1)	(1)
Washington	10	32, 884	123, 586	13	27, 770	120, 748
Wisconsin	1	7, 500	(1)	1	8, 500	(1)
Undistributed	----	1, 875	211, 645	----	23, 300	362, 653
Total	105	419, 460	4, 372, 194	115	470. 889	5, 138, 331

[1] Included with "Undistributed" to avoid disclosing individual company figures.

TABLE 4.—Peat produced in the United States in 1960, by kinds

(Short tons)

Kind	Total			Raw		Processed [1]	
	Quantity	Value		Quantity	Value	Quantity	Value
		Total	Average				
Moss	64, 634	$747, 863	$11. 57	17, 827	$185, 638	46, 807	$562, 225
Reed-sedge	244, 483	3, 376, 763	13. 81	13, 926	135, 367	230, 557	3, 241, 396
Humus	161, 772	1, 013, 705	6. 27	43, 459	188, 258	118, 313	825, 447
Total	[2] 470, 889	5, 138, 331	10. 91	75, 212	509, 263	395, 677	4, 629, 068

[1] Comprises 388,295 short tons shredded and 7,382 short tons kiln-dried.
[2] Includes 178,379 short tons of cultivated peat.

CONSUMPTION, USES, AND SHIPMENTS

The decrease in imports of peat was offset by the rise in production; more peat was available for consumption in 1960 than in any previous year.

Domestic peat was used for a variety of purposes, but 94 percent of the total was sold for general soil improvement. This peat was used chiefly by landscape contractors and gardeners as a base for building lawns and by homeowners for improving lawns and garden soils and for mulching.

Four percent of the total sold was used for potting soils and packing flowers. Peat for potting soils generally is mixed with sand or loam and packaged in small plastic bags that are marketed in most home and garden or variety stores. Some potting soil was prepared by peat producers, but mostly it was prepared by nurseries and other companies that purchased peat and mixed and packaged it.

Four producers sold peat for mushroom beds and four sold peat for use as seed inoculant. Virtually all of the peat sold for mushroom beds was in bulk; most all for seed inoculant was packaged. Peat for seed inoculant was finely ground, and it served as a culture medium for bacteria used to treat leguminous plants. Except for a very small quantity, all of this peat was kiln-dried.

Small quantities of peat were used for earthworm culture, seedbeds, golf course greens, and in mixed fertilizers. No peat was sold for fuel or energy purposes.

Domestic peat was sold in 46 States, the District of Columbia, and Canada. No shipments were reported to Hawaii, Mississippi, South Dakota, and Vermont. Michigan consumed 16 percent of the peat distributed, virtually all of which was produced within the State. In addition to being the chief consumer, Michigan was also the leading distributor, shipping peat to 43 other States, the District of Columbia, and Canada. Pennsylvania and Florida consumed 11 and 9 percent, respectively, of the total peat sold. Florida retained all of its production and received only small shipments from four other States, while in contrast nearly half of the peat distributed in Pennsylvania was shipped from other States. More than half of the peat produced in Indiana was shipped to 9 other States and the District of Columbia. Table 8 shows the destination of peat shipments.

About three-eighths of the peat sold was packaged, about the same percentage of the total as in 1959. The quantity sold packaged, however, was 17 percent greater than in the preceding year. Packaged sales have increased steadily since the introduction of synthetic films (chiefly polyethylene) from which inexpensive, moisture proof containers for peat can be manufactured. Such containers have enabled producers to distribute peat nationally, whereas only a few years ago, it was uneconomical to ship peat out of the producing area.

Producers' sales of peat in the United States, by uses, by kinds, and by States, are shown in tables 5, 6, and 7, respectively.

TABLE 5.—Peat sold in the United States in 1960, by uses

Use	In bulk			In packages			Total		
	Short tons	Value		Short tons	Value		Short tons	Value	
		Total	Average		Total	Average		Total	Average
Soil improvement	249,858	$1,646,581	$6.59	155,014	$2,450,773	$15.81	404,872	$4,097,354	$10.12
Potting soils and packing flowers	11,479	85,585	7.46	5,632	85,080	15.11	17,111	170,665	9.97
Seed inoculant	(1)	(2)	(2)	(1)	(2)	(2)	1,553	107,575	69.27
Mushroom beds	2,712	(2)	(2)	5	(2)	(2)	2,717	18,872	6.95
Earthworm-culture medium	530	(2)	(2)	5	(2)	(2)	535	3,776	7.06
Other [3]	3,881	(2)	(2)	1,548	(2)	(2)	3,876	58,268	15.03
Undistributed	--------	78,159	10.97	--------	110,332	70.82	--------	----------	------
Total	268,460	1,810,325	6.74	162,204	2,646,185	16.31	430,664	4,456,510	10.35

[1] Included with "Other" uses.
[2] Included with "Undistributed" to avoid disclosing individual company figures.
[3] Includes peat used in mixed fertilizer, seed beds, and on golf course greens.

TABLE 6.—Peat sold in the United States in 1960, by kinds

(Short tons)

Kind	In bulk			In packages			Total		
	Quantity	Value		Quantity	Value		Quantity	Value	
		Total	Average		Total	Average		Total	Average
Moss	38,894	$322.382	$8.29	22,715	$387,516	$17.06	61,609	$709,898	$11.52
Reed-sedge	93,304	863,356	9.25	128,277	2,000,789	15.60	221.581	2,864,145	12.93
Humus	136,262	624,587	4.58	11,212	257,880	23.00	147,474	882,467	5.98
Total	268,460	1,810,325	6.74	162,204	2,646.185	16.31	430,664	4.456.510	10.35

TABLE 7.—Peat sold in the United States, by States

State	In bulk: Short tons	In bulk: Value	In packages: Short tons	In packages: Value	Total: Short tons	Total: Value
1959						
Alaska						
California	17,389	$188,720	15,845	$228,435	33,234	$417,155
Colorado	6,674	35,488			6,674	35,488
Connecticut	2,065	12,605	25	500	2,090	13,105
Florida	34,446	158,139			34,446	158,139
Georgia	(1)	(1)	(1)	(1)	4,288	(1)
Idaho	(1)	(1)			(1)	(1)
Illinois	7,706	43,327	1,411	28,217	9,117	71,544
Indiana	10,811	110,454	4,582	91,640	15,393	202,094
Iowa						
Maine			(1)	(1)	(1)	(1)
Massachusetts	773	(1)			773	(1)
Michigan	82,461	465,904	97,408	1,624,638	179,869	2,090,542
Minnesota						
New Hampshire	25	(1)			25	(1)
New Jersey	23,835	217,332	6,748	85,827	30,583	303,159
New York	10,050	86,000	1,516	33,400	11,566	119,400
Ohio	5,348	41,624	450	31,500	5,798	73,124
Pennsylvania	22,131	189,048	1,865	43,343	23,996	232,391
South Carolina	3,470	(1)	724	(1)	4,194	(1)
Washington	32,884	123,586			32,884	123,586
Wisconsin			7,500	(1)	7,500	(1)
Undistributed	4,355	65,162	1,113	122,490	1,180	187,652
Total	264,423	1,737,389	139,187	2,289,990	403,610	4,027,379
1960						
Alaska	376	(1)			376	(1)
California	18,766	$248,626	13,325	$223,475	32,091	$472,101
Colorado	9,384	37,542			9,384	37,542
Connecticut	(1)	(1)			(1)	(1)
Florida	39,275	162,093			39,275	162,093
Georgia	6,519	(1)	385	(1)	6,904	73,578
Idaho	(1)	(1)			(1)	(1)
Illinois	6,179	27,947			6,179	27,947
Indiana	(1)	(1)	(1)	(1)	24,484	255,250
Iowa	(1)	(1)			(1)	(1)
Maine						
Massachusetts	(1)	(1)			(1)	(1)
Michigan	66,362	344,344	124,727	1,905,352	191,089	2,249,696
Minnesota	90	975	1,352	68,820	1,442	69,795
New Hampshire	23	(1)			23	(1)
New Jersey	(1)	(1)	(1)	(1)	24,650	187,000
New York	(1)	(1)	(1)	(1)	6,602	93,271
Ohio	5,762	45,306	993	47,542	6,755	92,848
Pennsylvania	22,512	178,148	6,725	133,609	29,237	311,757
South Carolina	(1)	(1)	(1)	(1)	(1)	(1)
Washington	27,344	119,469			27,344	119,469
Wisconsin			1,529	(1)	1,529	(1)
Undistributed	65,868	645,875	13,168	267,387	23,300	304,163
Total	268,460	1,810,325	162,204	2,646,185	430,664	4,456,510

[1] Included with "Undistributed" to avoid disclosing individual company figures.

TABLE 8.—Destination of peat shipments [1]

(Short tons)

State	1959	1960	State	1959	1960
Alabama	258	224	New Hampshire	113	38
Alaska		376	New Jersey	22,769	26,563
Arizona	1,649	1,818	New Mexico	11,711	1,204
Arkansas	134	124	New York	34,709	38,903
California	32,194	31,738	North Carolina	2,947	5,149
Colorado	3,593	9,821	North Dakota		32
Connecticut	3,296	4,975	Ohio	27,395	32,101
Delaware	1,856	987	Oklahoma	1,028	1,107
District of Columbia	2,620	2,846	Oregon	230	315
Florida	34,867	39,763	Pennsylvania	39,779	48,741
Georgia	3,403	4,173	Rhode Island	1,260	933
Idaho	600	1,563	South Carolina	2,107	3,885
Illinois	11,600	9,621	Tennessee	2,526	3,724
Indiana	7,043	11,375	Texas	8,925	7,008
Iowa	122	9,037	Utah	538	435
Kansas	686	674	Vermont	25	
Kentucky	3,829	2,994	Virginia	3,296	3,668
Louisiana	30	96	Washington	32,952	27,489
Maine	450	150	West Virginia	1,018	1,224
Maryland	10,893	13,895	Wisconsin	7,733	1,301
Massachusetts	3,220	4,520	Wyoming	48	53
Michigan	74,458	68,049			
Minnesota		1,492	Total	403,420	430,531
Missouri	4,363	5,150	Exported	190	133
Montana	200	194			
Nebraska	568	297	Grand total	403,610	430,664
Nevada	379	706			

[1] Based upon reports from producers showing destination of peat used or sold.

VALUE AND PRICE

Total value of production increased 18 percent over 1959, reaching $5.1 million. The overall unit value also increased; the increase in total value, however, was due chiefly to the larger output.

The values assigned to production, as shown in table 4, were based upon receipts from commercial sales, f.o.b. plant, as reported by producers. The values for sales were also at the producing level and were shown as reported.

Reed-sedge peat had the highest value; moss peat was second in value; and humus, third. These values are inconclusive, however, for the amount that a producer receives for peat depends more upon such factors as the location of his operation, amount of processing, and whether the peat was sold in bulk or packaged, than upon the kind of peat sold.

The average value per ton for all peat produced in 1960 was $10.91. This was slightly greater than the unit value of peat sales because about 40,000 tons of peat with an overall larger unit value remained unsold. The average value of raw peat was $6.77 per ton and of processed peat, $11.70 per ton. The average value of all peat sold in bulk was $6.74 per ton and of packaged peat, $16.31 per ton. Peat that was sold for use as seed inoculant had the highest unit value, $69.27 per ton. This was specially prepared peat, virtually all of which was kiln-dried, with a moisture content of less than 10 percent.

The total value of peat imports decreased slightly because less peat was imported. The overall unit value of imported peat, however, was about 8 percent higher than in 1959. Imported peat had an assigned value about 5 times greater than that shown for domestic peat, but the values are not comparable because they were assigned at different marketing levels. Values shown for domestic peat were at the producing level and were equivalent to the amount realized by producers from sales; values of imported peat were established at the port of embarkation and were equal to prices paid by importers, less transportation and miscellaneous other charges. In some instances, however, the values assigned to foreign peat also may have included other nondutiable charges such as marine insurance and freight.

It is difficult to compare foreign and domestic peat on a cost-per-unit basis because they are of different quality and there usually is a large variance in moisture content between the two types. Moreover, domestic peat usually is sold by weight, whereas foreign peat is sold by volume. Although other factors are important when peat is used for soil improvement, two important factors relating to the real cost of peat are moisture and organic-matter content. These properties, however, are not stated on most foreign and packaged domestic peat.

Retail prices for peat were comparable to those in 1959. Packaged domestic peat could be purchased in the Washington, D.C., area for less than $2.00 per 100-pound bag. A 7½-cubic-foot bale of imported peat could be purchased for $4.00 to $5.00.

TABLE 9.—Average value per ton of peat produced, by kinds, and sold, by uses

Year	Average value per ton produced			Average value per ton sold	
	Moss	Reed-sedge	Humus	Soil improvement	Other uses
1947–49 (average)	$12.20	$7.64	$6.86	$6.33	$9.15
1956	12.55	11.32	5.46	8.32	9.67
1957	12.49	14.07	5.97	10.70	12.26
1958	14.11	14.10	7.01	10.17	12.76
1959	12.41	13.68	5.50	9.98	10.02
1960	11.57	13.81	6.27	10.12	13.93

FOREIGN TRADE [3]

Imports decreased 8 percent in 1960, but the quantity imported was still nearly three times greater than in 1947–49.

Canada continued to be the principal source of foreign peat, supplying 60 percent of the total imports. Canadian shipments, however, were approximately 21,000 tons less than in the preceding year, a decline of 12 percent. The remainder of the imports was supplied by Europe, except for a small quantity from Japan and Mexico.

West Germany supplied almost one-third of the total imports and nearly four-fifths of the peat shipped to the United States from Europe. About 3 percent was imported from Netherlands, and an additional 3 percent was supplied by Poland and Danzig. Two percent of the foreign peat was shipped from Denmark, and small quan-

[3] Figures on imports compiled by Mae B. Price and Elsie D. Jackson, Division of Foreign Activities, Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.

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tities were imported from 7 other European countries. Imports from Europe decreased about 2,100 tons, a decline of about 2 percent.

All imported peat was moss peat and was classified by the Bureau of the Census into two grades: "Poultry and stable" and "Fertilizer." Data were not available on end uses; generally, however, Poultry and stable grade is suitable for use as poultry and animal litter, whereas Fertilizer grade is used for various types of soil improvement. Of the imports, 97 percent was Fertilizer grade peat. This grade entered the United States duty free, but a duty of $0.25 per long ton was levied on peat classified as Poultry and stable grade.

Most of the peat produced in Canada was exported to the United States, chiefly as Fertilizer-grade peat. It was packaged chiefly in paper cartons with synthetic film liners or pressed into bales that are covered with burlap and bound with wooden slats and wire. These bales usually measure 12 cubic feet and weigh 100 to 150 pounds. Canadian peat is shipped in three grades: (1) Coarse, for use as stable litter; (2) medium, for poultry and small animal litter; and (3) fine, for soil conditioner, packing, and insulation. The largest quantities of the peat imported from Canada were produced in British Columbia and entered the United States through the Washington customs district.

Peat from West Germany usually is packaged in burlap-covered bales and is similar in quality to that shipped from Canada. Ninety-six percent of the German imports was Fertilizer grade that entered the United States chiefly through the New York, Philadelphia, Maryland, Florida, and New Orleans customs districts.

Data on peat imports are shown in tables 10, 11, and 12. Only a negligible amount of peat was exported.

TABLE 10.—Peat moss imported for consumption in the United States, by kinds and by countries

Country	Poultry and stable grade		Fertilizer grade		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
			1958			
North America:						
Canada	6,220	$460,597	141,651	$7,209,825	147,871	$7,670,422
Mexico	9	255			9	255
Total	6,229	460,852	141,651	7,209,825	147,880	7,670,677
Europe:						
Belgium-Luxembourg			30	1,500	30	1,500
Denmark			5,897	274,897	5,897	274,897
Germany, West	3,828	131,263	96,332	3,308,009	100,160	3,439,272
Ireland			1,334	46,270	1,334	46,270
Netherlands	196	7,551	8,447	346,584	8,643	354,135
Poland and Danzig			3,416	134,368	3,416	134,368
Portugal			54	2,400	54	2,400
Sweden			492	32,559	492	32,559
United Kingdom	12	416	1,048	66,459	1,060	66,875
Total	4,036	139,230	117,050	4,213,046	121,086	4,352,276
Asia: Japan	7	1,448	123	10,272	130	11,720
Grand total	10,272	601,530	258,824	11,433,143	269,096	12,034,673
			1959			
North America:						
Canada	6,340	450,472	171,785	8,975,697	178,125	9,426,169
Mexico	19	527			19	527
Total	6,359	450,999	171,785	8,975,697	178,144	9,426,696
Europe:						
Belgium-Luxembourg			47	1,410	47	1,410
Denmark			5,354	232,665	5,354	232,665
France			42	1,634	42	1,634
Germany, West	3,025	107,692	85,031	3,143,205	88,056	3,250,897
Netherlands	295	15,230	8,808	368,347	9,103	383,577
Poland and Danzig			5,500	249,925	5,500	249,925
Sweden	25	1,024	12	640	37	1,664
United Kingdom			399	27,549	399	27,549
Total	3,345	123,946	105,193	4,025,375	108,538	4,149,321
Asia: Japan	9	2,250	28	1,831	37	4,081
Grand total	9,713	577,195	277,006	13,002,903	286,719	13,580,098
			1960			
North America:						
Canada	5,593	353,993	151,860	8,918,092	157,453	9,272,085
Mexico	25	915			25	915
Total	5,618	354,908	151,860	8,918,092	157,478	9,273,000
Europe:						
Belgium-Luxembourg			46	3,390	46	3,390
Czechoslovakia			43	2,186	43	2,186
Denmark			5,553	256,204	5,553	256,204
Finland			83	2,944	83	2,944
Germany, West	3,303	131,836	80,282	3,108,597	83,585	3,240,433
Ireland			273	12,837	273	12,837
Netherlands	150	8,406	7,853	334,498	8,003	342,904
Norway			24	5,649	24	5,649
Poland and Danzig			8,120	332,235	8,120	332,235
Sweden			524	29,400	524	29,400
United Kingdom			132	5,342	132	5,342
Total	3,453	140,242	102,933	4,093,282	106,386	4,233,524
Asia: Japan	12	2,371	1	120	13	2,491
Grand total	9,083	497,521	254,794	13,011,494	263,877	13,509,015

Source: Bureau of the Census.

TABLE 11.—Peat moss imported for consumption in the United States in 1960, by kinds and by customs districts

Customs districts	Poultry and stable grade		Fertilizer grade		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
Buffalo	58	$2,298	24,059	$1,169,893	24,117	$1,172,191
Dakota	1,701	127,534	10,675	726,494	12,376	854,028
Duluth and Superior	1,086	53,688	1,399	71,163	2,485	124,851
Florida	52	1,680	8,423	324,024	8,475	325,704
Galveston	183	6,242	2,737	91,706	2,920	97,948
Georgia			490	13,522	490	13,522
Hawaii	12	2,371	3	305	15	2,676
Laredo	25	915	430	23,215	455	24,130
Los Angeles	111	3,840	4,259	229,707	4,370	233,547
Maine and New Hampshire	43	1,284	1,445	82,060	1,488	83,344
Maryland	363	13,080	10,219	403,213	10,582	416,293
Massachusetts			5,597	195,880	5,597	195,880
Michigan	856	37,473	22,457	1,088,673	23,313	1,126,146
Minnesota			20	1,044	20	1,044
Mobile			3,954	141,277	3,954	141,277
Montana and Idaho			103	7,473	103	7,473
New Orleans	956	32,148	8,016	343,508	8,972	375,656
New York	1,103	54,212	36,189	1,503,216	37,292	1,557,428
North Carolina			488	19,251	488	19,251
Oregon			447	22,082	447	22,082
Philadelphia	315	11,208	15,214	519,469	15,529	530,677
Puerto Rico			195	6,821	195	6,821
Sabine			15	528	15	528
St. Lawrence	95	4,756	9,296	401,808	9,391	406,564
San Francisco			1,352	55,968	1,352	55,968
South Carolina	121	5,625	906	31,473	1,027	37,098
Vermont	131	4,991	16,458	715,487	16,589	720,478
Virginia	116	3,340	3,418	140,442	3,534	143,782
Washington	1,756	130,836	66,406	4,675,155	68,162	4,805,991
Wisconsin			124	6,637	124	6,637
Total	9,083	497,521	254,794	13,011,494	263,877	13,509,015

Source: Bureau of the Census.

TABLE 12.—Peat moss imported from Canada and West Germany in 1960, by kinds and by customs districts

Customs districts	Canada				West Germany			
	Poultry and stable grade		Fertilizer grade		Poultry and stable grade		Fertilizer grade	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Buffalo	58	$2,298	24,039	$1,169,333			20	$560
Dakota	1,701	127,534	10,675	726,494				
Duluth and Superior	1,086	53,688	1,399	71,163				
Florida					52	$1,680	8,012	308,890
Galveston					183	6,242	2,333	76,096
Georgia							429	12,533
Hawaii			3	305				
Laredo							114	3,335
Los Angeles					111	3,840	2,724	134,106
Maine and New Hampshire	43	1,284	1,410	80,860			35	1,200
Maryland					352	12,583	8,847	329,490
Massachusetts							2,594	85,515
Michigan	738	29,926	22,009	1,066,752	118	7,547	448	21,921
Minnesota							20	1,044
Mobile							3,854	138,411
Montana and Idaho			103	7,473				
New Orleans					956	32,148	6,560	276,743
New York			12	977	964	46,303	29,313	1,170,433
North Carolina							418	17,076
Oregon							421	20,445
Philadelphia					315	11,208	8,868	308,816
Puerto Rico							195	6,821
Sabine							15	528
St. Lawrence	80	3,436	9,296	401,808	15	1,320		
San Francisco							1,243	49,088
South Carolina					121	5,625	906	31,473
Vermont	131	4,991	16,458	715,487				
Virginia					116	3,340	2,892	113,260
Washington	1,756	130,836	66,332	4,670,803			21	813
Wisconsin			124	6,637				
Total	5,593	353,993	151,860	8,918,092	3,303	131,836	80,282	3,108,597

Source: Bureau of the Census.

TECHNOLOGY

Recent research[4] at the University of Minnesota has shown that mixtures of peat and sodium hydroxide can function effectively as binders for making pellets from magnetic taconite concentrate. In a normal pelletizing process, taconite ore is crushed and the finely divided iron ore is separated from ore slurry, mixed with a binder, and rolled into marble-sized balls in a rotary drum. A binder is required to hold the ore particles together and to prevent the pellets from crumbling during processing; the most satisfactory binders are bentonite and gelatinized starch.

In the tests, several types of Minnesota peat were mixed with sodium hydroxide and added in varying proportions to fine ore concentrates. Results showed that these additions increased the crushing strength of dry pellets to 16 pounds per square inch, about 60 percent greater than the minimum satisfactory strength of 10 pounds. Additions of about 12 pounds of peat and 1 pound of sodium hydroxide per ton of concentrate made pellets with the greatest strength. Mixtures of

[4] Piret, E. L., White, R. G., Walther, H. C., Jr., and Madden, A. J., Jr., Pelletizing Magnetic Taconite Concentrate: Ind. Eng. Chem. vol. 53, No. 3, March 1961, pp. 215–216.

herbaceous and sphagnum peats were used for the tests, and the experiments suggest that the humic acids constituent of peat play a major role in its binding properties, as mixtures with the higher content of humic acids produced the strongest pellets. Peat with a relatively low humic acids content, however, also produced pellets with crushing strengths above the minimum required. Sodium hydroxide was added to dissolve the humic acids in peat, but a dry alkali such as sodium carbonate can be mixed with peat to provide a dry, powdered binder. About 2½ times as much sodium carbonate as sodium hydroxide is required for comparable and acceptable dry strengths. This research did not reveal any economic data on peat-alkali binders; but if they can compete with present binding agents for taconite pellets, the iron-ore industry, which produced more than 10 million tons of pellets in 1960, offers a potential industrial market for peat produced in the United States.

As mentioned in previous reports, a number of foreign countries have developed industrial uses for peat, particularly as fuel for electric power generation. In the United States, however, virtually all interest in peat was centered in agricultural and horticultural uses.

WORLD REVIEW

World peat production in 1960 was estimated at 75.7 million tons. Ninety-nine percent of the total was produced in Europe; the remainder (less than 1 million tons), in Canada, Israel, Japan, Korea, and the United States.

The U.S.S.R. was the largest producer, with production estimated at 66.1 million tons, about 87 percent of the world output. This quantity represented peat used for fuel only and did not include peat used for agricultural purposes.

Large quantities of peat are used in agriculture and as litter material in the Soviet Union. Data on production in 1960 are not available, but previously published data[5] revealed that 57.6 million tons of agricultural peat was produced in 1958. Plans call for production of 158 million tons for agricultural purposes by 1965.

The Soviet Union has extensive peat reserves (estimated at 174 billion tons of air-dried peat, about 60 percent of the world total),[6] and peat has been used for many years in certain areas as a source of energy. Peat is used chiefly as fuel in power stations and other industrial plants, and some is converted into briquets for domestic fuel. The current total installed capacity of peat-fired power stations is nearly 2,000 megawatts.[7] It was reported[8] that in 1957 electric powerplants consumed 24 million tons of fuel peat, 40 percent of the total fuel peat produced. One large power station operating solely on peat produced 1 kw.-hr. of electricity for each 3¼ pounds

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[5] Antonov, V. Ya., and Others, Obshchiy Kurs Tekhnologii Torfodobyvaniya (A General Course in the Technology of Peat Production): Gosenergoizdat, Moscow; 1959, p. 300.
Torfyanaya Promyshlennost, Za Dal'neyshiy Progress Torfyanoy Promyshlennosti (For Further Progress in the Peat Industry): Gosenergoizdat, Moscow, January 1959, p. 4.

[6] Bausin, A. F., and Others, 40 Let Torfyanoy Promyshlennosti SSSR (Forty Years of the USSR Peat Industry): Gosenergoizdat, Moscow, 1957, p. 15.

[7] Jour. Inst. Fuel, Fuel Technology in the U.S.S.R.: vol. 34, No. 242, March 1961, p. 95.

[8] Strukov, B. I., K 41–Y Godovshchine Velikoy Oktyabr'skoy Sotsialisticheskoy Revolyutsii (The Peat Industry on the 41st Anniversary of the October Socialist Revolution): Torfyanaya Promyshlennost', Gosenergoizdat, Moscow, No. 7, 1958, pp. 1–4.

of peat burned. It is estimated that one-third of the fuel peat currently is used in industrial plants other than powerplants, about 10 percent in gas-generator plants, and about 5 percent for producing briquets. Projected production of peat briquets[9] for 1965 is 4.3 million tons.

Ireland ranked second in production with 4.6 million tons, 6 percent of the world total. With only meager reserves of other fuels, Ireland has relied on peat for centuries for domestic fuel and for many years imported much of the fuel required by industrial plants, particularly electric powerplants. Many electric powerplants in Ireland now use peat, however, and in 1958, seven peat-fired power stations generated more than one-third of the country's electric power output. One plant at Ferbane has a capacity of 60 megawatts and is equipped with three 20,000-kw. steam turbo-alternators, capable of producing 240 million units of electricity per year. In addition to the peat used for power generation, substantial quantities of milled peat are briquetted for residential and industrial heating.

West Germany produced 1.9 million tons of peat, of which slightly more than half was used for fuel. Germany used some peat for electric-power generation and substantial quantities for domestic heating, but 880 thousand tons was produced for agricultural and farm use. About 10 percent of the agricultural peat was exported to the United States.

East Germany, Netherlands, United States, Sweden, Denmark, and Canada ranked next in production, but their combined output was only 3 percent of the total. Nine other countries produced peat but their total output was less than 2 percent of the total. The United States produced 0.6 percent of the total peat and ranked sixth in world production.

World production of peat, by countries, is shown in table 13.

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[9] Antonov, V. Ya., and Others, Obshchiy Kurs Tekhnologii Torfodobyvaniya (A General Course in the Technology of Peat Production): Gosenergoizdat, Moscow, 1959, pp. 11–12.

TABLE 13.—World production of peat, by countries [1]

(Thousand short tons)

Country	1956	1957	1958	1959	1960
Austria, fuel [2]	45	40	45	40	40
Canada, agricultural use [3]	128	138	150	184	183
Denmark	778	809	424	463	187
Finland:					
Agricultural use	3	2	2	6	[2] 6
Fuel	180	197	162	160	[2] 165
France:					
Agricultural use	45	[2] 45	[2] 22	36	[2] 39
Fuel	6	[2] 6	[2] 3	6	[2] 6
Germany:					
East [2]	550	550	550	550	550
West:					
Agricultural use	659	780	819	931	[2] 880
Fuel	1,005	808	649	972	[2] 990
Hungary [2]	65	65	65	65	65
Ireland:					
Agricultural use	9	14	10	8	14
Fuel	4,006	4,375	2,491	4,805	[2] 4,630
Israel, agricultural use	42	22	[2] 28	[2] 44	[2] 50
Japan [2]	75	80	80	80	80
Korea, Republic of	288	269	141	[2] 140	[2] 140
Netherlands [2]	500	500	500	500	500
Norway:					
Agricultural use	29	28	[2] 33	[2] 33	[2] 33
Fuel	263	[2] 260	64	66	[2] 66
Poland	729	400	137	[2] 140	[2] 140
Sweden:					
Agricultural use	82	80	69	[2] 70	[2] 70
Fuel	275	314	281	[2] 275	[2] 275
U.S.S.R., fuel	49,400	60,500	57,600	66,700	[2] 66,100
United States, agricultural use	292	316	328	419	471
World total [2] [4]	59,500	70,600	64,700	76,700	75,700

[1] Includes revisions of data published previously. Data do not add to totals shown because of rounding.
[2] Estimated.
[3] In addition, Canada produced a negligible quantity of peat fuel.
[4] Iceland, Italy, and Spain produced a negligible quantity of peat fuel.

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

B. Petroleum and Related Products

Carbon Black

By Ivan F. Avery [1] and Lulie V. Harvey [2]

Contents

GENERAL SUMMARY

PRODUCTION of carbon black in the United States increased 4 percent in 1960. Furnace blacks increased to 86 percent of the national total, whereas channel blacks declined to 14 percent. Larger output was reported in all producing States, except Arkansas, Oklahoma, and California. Total domestic sales, however, declined 7 percent, and stocks increased 74 million pounds during the year.

Exports increased 6 percent. Sales to the rubber industry, which purchased 95 percent of the domestically consumed carbon black, declined 7 percent in 1960 and supplied most of the decline in total consumption. Sales to the other major consumers also declined, but sales to the ink industry increased 1 percent.

TABLE 1.—Salient statistics of carbon black produced from natural gas and liquid hydrocarbons in the United States

(Thousand pounds)

	1956	1957	1958	1959	1960
Production:					
Channel process	363, 672	357, 557	324, 743	321, 030	292, 422
Furnace processes	1, 476, 296	1, 440, 868	1, 319, 862	1, 646, 497	1, 761, 305
Total	1, 839, 968	1, 798, 425	1, 644, 605	1, 967, 527	2, 053, 727
Shipments:					
Domestic sales	1, 303, 029	1, 331, 366	1, 250, 937	1, 532, 249	1, 429, 618
Exports	425, 328	459, 671	440, 542	513, 143	543, 032
Total	1, 728, 357	1, 791, 037	1, 691, 479	2, 045, 392	1, 972, 650
Losses	961	5, 563	1, 602	4, 165	6, 978
Stocks of producers, Dec. 31	347, 574	349, 399	300, 923	218, 893	292, 992
VALUE					
Production .... thousand dollars	120, 252	127, 979	115, 042	137, 983	150. 74
Average per pound .... cents	6. 53	7. 12	7. 00	7. 01	7. 34

[1] Commodity-industry analyst.
[2] Statistical assistant.

SCOPE OF REPORT

Carbon black is a very pure grade of quasi-graphitic carbon, with particle diameters ranging from 50 to 5,000 angstrom units.

Annual reports were submitted to the Bureau of Mines by operators of all commercial plants in the United States.

Monthly figures are based on reports prepared by the National Gas Products Association and are adjusted to agree with the annual reports received by the Bureau of Mines.

Import and export data are compiled by the Bureau of the Census, U.S. Department of Commerce.

Statistics are obtained on both furnace and channel blacks. Furnace blacks are reported in eight grades: Semireinforcing Furnace (SRF), High-Modulus Furnace (HMF), General-Purpose Furnace (GPF), Fast-Extrusion Furnace (FEF), High-Abrasion Furnace (HAF), Superabrasion Furnace (SAF), Intermediate-Abrasion Furnace (ISAF), and Thermal. Production and uses of the various grades are described in Minerals Yearbook, 1948 and 1949.

PRODUCTION

Number and Capacity of Plants.—Total capacity at operating carbon-black plants in 1960, including channel- and furnace-black plants, increased to 6,433,100 pounds per day or 672,800 pounds per day more than in 1959. The number of furnace-black plants operating in 1960 increased by 1 to 27 plants, and total daily capacity to 5,654,800 pounds, compared with 4,760,000 pounds in 1959. The number of channel-black plants operating in 1960 remained at 15, but total daily capacity declined to 788,300 pounds, from 1 million pounds in 1959. indicating a decrease in capacity at existing plants.

Method and Yield.—Output of carbon black in the major producing States of Texas and Louisiana increased 5 percent and 6 percent, respectively, in 1960, whereas the combined production from the other States declined 2 percent. With the addition of a new plant in Texas in 1960, the total number of producing plants was increased to 42. Production of furnace black increased 7 percent, and channel black output declined 9 percent, resulting in an overall increase of 4 percent in 1960. In 1960, 151,198 million cubic feet of natural gas was consumed to produce 292,422 thousand pounds of channel black—a yield of 1.93 pounds per thousand cubic feet. Furnace-black plants consumed as feed 46,430 million cubic feet of natural gas, producing 345,862 thousand pounds of furnace black, a yield of 7.45 pounds per thousand cubic feet. In addition, 313,020 thousand gallons of hydrocarbon liquid feed was consumed to produce 1,415,443 thousand pounds of furnace black, a yield of 4.52 pounds per gallon, compared with 4.22 pounds in 1959.

TABLE 2.—Carbon black produced from natural gas and liquid hydrocarbons in the United States, by States and districts

(Thousand pounds)

State and district	1956	1957	1958	1959	1960	Change from 1959 (percent)
Louisiana	537,723	533,847	502,742	599,523	[1] 631,488	+5
Texas:						
Panhandle district	574,234	544,068	474,564	572,157	561,119	−2
Rest of State	414,795	415,455	369,831	450,639	[1] 523,737	+16
Total Texas	989,029	959,523	844,395	1,022,796	1,084,856	+6
Other States	313,216	305,055	297,468	345,208	337,383	−2
Grand total	1,839,968	1,798,425	1,644,605	1,967,527	2,053,727	+4

[1] Small amount of channel black produced in Louisiana included in "Texas: Rest of State" to avoid disclosure.

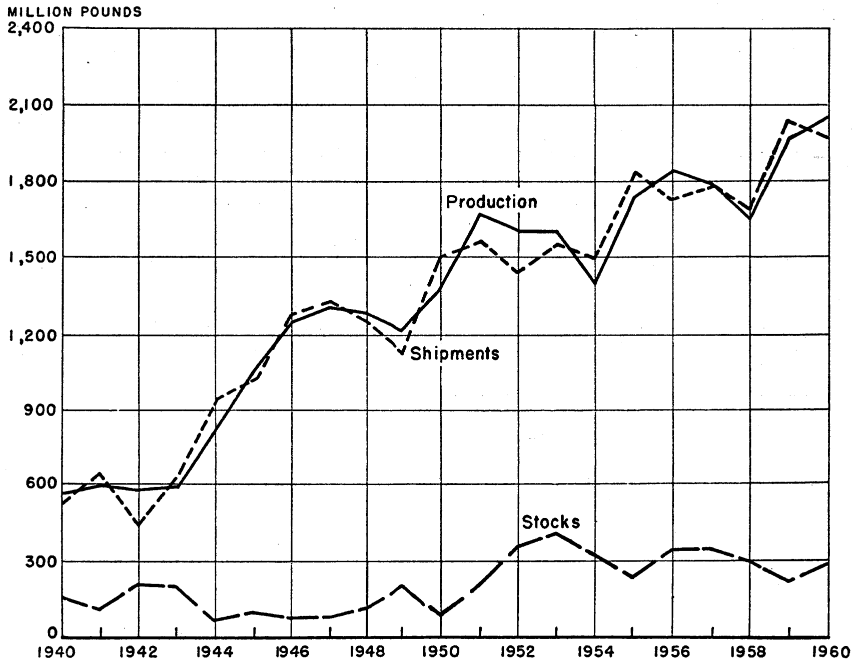

FIGURE 1.—Production, stocks, and shipments of carbon black, 1940–60.

TABLE 3.—Carbon black produced in the United States, 1960, by States and districts, and natural gas and liquid hydrocarbons used in its manufacture

State or district	Producers reporting [1]	Number of plants	Production					
			Furnace black			Channel black		
			Thousand pounds	Value at plant: Total (thousand dollars)	Value at plant: Cents per pound	Thousand pounds	Value at plant: Total (thousand dollars)	Value at plant: Cents per pound
Louisiana	6	9	631,488	42,263	6.69	(2)	(2)	(2)
Texas:								
Panhandle district	7	12	482,738	33,234	6.88	78,381	11,146	14.22
Rest of State	6	12	396,231	28,718	7.25	[2] 127,506	[2] 11,060	[2] 8.67
Total Texas	8	24	878,969	61,952	7.05	[2] 205,887	[2] 22,206	[2] 10.79
Arkansas	1	1						
Oklahoma	1	1						
California	1	1	227,001	15,831	6.97	---------	---------	-------
Kansas	2	2						
New Mexico	3	4	23,847	1,168	4.90	86,535	7,354	8.50
Grand total:								
1960	11	42	1,761,305	121,214	6.88	292,422	29,560	10.11
1959	11	41	1,646,497	108,374	6.58	321,030	29,550	9.20

State or district	Natural gas used					Liquid hydrocarbons used			
	Million cubic feet	Average yield [3] (pounds per M cubic feet): Furnace	Average yield [3] (pounds per M cubic feet): Channel	Value: Total (thousand dollars)	Value: Average (cents per M cubic feet)	Thousand gallons	Average yield (pounds per gallon)	Value: Total (thousand dollars)	Value: Average (cents per gallon)
Louisiana	21,786	7.56	0.36	2,454	11.26	93,024	5.03	7,042	7.59
Texas:									
Panhandle district	56,990	7.48	1.79	6,033	10.59	97,015	3.96	6,295	6.49
Rest of State	66,572	0.63	2.08	6,626	9.95	82,644	4.75	6,343	7.68
Total Texas	123,562	5.53	1.96	12,659	10.25	179,659	4.32	12,638	7.03
Arkansas	---------	---------	---------	---------	---------				
Oklahoma	---------	---------	---------	---------	---------				
California	4,080	13.83	--------	856	20.98	40,337	4.23	2,374	5.89
Kansas									
New Mexico	48,200	10.50	1.88	3,884	8.06	--------	--------	--------	--------
Grand total:									
1960	197,628	7.45	1.93	19,853	10.05	313,020	4.52	22,054	7.05
1959	214,612	8.01	1.93	19,712	9.19	297,639	4.22	20,048	6.74

[1] Detail will not add to totals because some producers operated in more than 1 area.
[2] Included with "Texas: Rest of State" to avoid disclosure.
[3] Partly estimated.

TABLE 4.—Production and shipments of carbon black in the United States in 1960, by months and grades

(Thousand pounds)

PRODUCTION [1]

Month	Furnace									Channel	Total
	SRF [2]	HMF [3]	GPF [4]	FEF [5]	HAF [6]	SAF [7]	ISAF [8]	Thermal	Total		
January	27,226	6,622	9,490	21,440	49,846	------	24,718	14,742	154,084	25,595	179,679
February	25,756	5,898	9,752	22,588	43,864	1,562	25,257	12,435	147,112	23,509	170,621
March	28,154	5,757	9,862	23,412	44,514	1,793	30,084	14,687	158,263	25,105	183,368
April	30,274	6,860	10,452	20,440	43,096	2,861	29,690	13,478	157,151	25,160	182,311
May	30,479	7,336	10,743	22,928	52,649	360	26,271	13,334	164,100	25,111	189,211
June	27,267	6,865	10,825	20,815	44,743	2,068	25,584	12,002	150,169	23,648	173,817
July	28,973	5,473	11,349	20,440	44,742	913	25,386	11,478	148,754	23,934	172,688
August	26,889	6,082	11,318	20,434	41,127	1,630	28,868	11,235	147,583	23,999	171,582
September	23,934	7,221	8,910	16,581	37,841	552	27,710	10,571	133,320	24,064	157,384
October	24,724	3,723	10,736	17,014	37,464	1,174	23,597	11,619	130,051	24,659	154,710
November	23,830	5,192	10,683	14,086	41,554	1,663	22,319	11,767	131,094	23,566	154,660
December	24,264	3,459	11,844	16,768	45,434	1,162	24,641	12,052	139,624	24,072	163,696
Total	321,770	70,488	125,964	236,946	526,874	15,738	314,125	149,400	1,761,305	292,422	2,053,727

SHIPMENTS (INCLUDING EXPORTS) [9]

Month	SRF	HMF	GPF	FEF	HAF	SAF	ISAF	Thermal	Total	Channel	Total
January	25,468	5,466	8,226	21,178	45,478	982	22,693	19,370	148,861	40,990	189,851
February	25,823	6,699	9,070	21,158	42,579	1,181	26,881	9,158	142,549	15,543	158,092
March	29,542	6,678	9,594	22,780	44,023	1,763	27,835	14,098	156,313	23,772	180,085
April	28,332	6,893	11,592	19,566	45,430	1,854	25,716	12,129	151,512	26,767	178,279
May	26,021	5,658	11,100	17,695	39,798	2,213	25,641	12,530	140,656	22,594	163,250
June	24,093	5,201	10,361	20,729	43,726	1,790	27,427	11,474	144,801	20,899	165,700
July	24,578	4,808	9,539	17,403	35,328	2,141	26,249	9,804	129,850	20,349	150,199
August	25,571	5,482	10,008	18,220	46,823	1,063	23,181	12,298	142,646	24,774	167,420
September	24,890	4,492	10,573	19,745	37,776	867	24,734	12,348	135,425	24,181	159,606
October	23,226	3,779	10,194	20,240	37,875	1,948	25,998	12,242	135,502	21,885	157,387
November	24,470	4,432	11,456	16,715	43,084	1,135	24,677	11,771	137,740	26,131	163,871
December	21,271	3,607	10,556	16,510	38,910	1,150	23,062	9,946	125,012	20,876	145,888
Total	303,285	63,195	122,269	231,939	500,830	18,087	304,094	147,168	1,690,867	288,761	1,979,628

[1] Compiled from reports of the National Gas Products Association and of producing companies not included in association figures. Figures adjusted to agree with annual reports of individual producers.
[2] Semireinforcing Furnace.
[3] High-Modulus Furnace.
[4] General-Purpose Furnace.
[5] Fast-Extrusion Furnace.
[6] High-Abrasion Furnace.
[7] Superabrasion Furnace.
[8] Intermediate-Abrasion Furnace.
[9] Includes losses.

TABLE 5.—Natural gas and liquid hydrocarbons used in manufacturing carbon black in the United States and average yield

	1956	1957	1958	1959	1960
Natural gas used ---- million cubic feet	242,598	233,788	211,048	214,612	197,628
Average yield of carbon black per thousand cubic feet ---- pounds	3.56	3.40	3.32	3.31	3.23
Average value of natural gas used per thousand cubic feet ---- cents	7.68	8.26	8.44	9.19	10.05
Liquid hydrocarbons used ---- thousand gallons	242,406	240,413	231,057	297,639	313,020
Average yield of carbon black per gallon ---- pounds	4.03	4.18	4.09	4.22	4.52
Average value of liquid hydrocarbons used per gallon ---- cents	6.79	7.36	6.79	6.74	7.05
Number of producers reporting	11	12	11	11	11
Number of plants	42	42	41	41	42

TABLE 6.—Number and capacity of carbon-black plants operated in the United States

State or district	County or Parish	Number of plants 1959 Channel	Number of plants 1959 Furnace	Number of plants 1960 Channel	Number of plants 1960 Furnace	Total daily capacity (pounds) 1959	Total daily capacity (pounds) 1960
Texas:							
Panhandle district	Carson	1	-------	1	-------		
	Gray	3	1	3	1		
	Hutchinson	1	4	1	4	1,660,000	1,836,500
	Moore	-------	1	-------	1		
	Wheeler	-------	1	-------	1		
Total Panhandle district		5	7	5	7	1,660,000	1,836,500
Rest of State	Aransas	1	1	1	1		
	Brazoria	1	-------	1	-------		
	Brooks	1	-------	1	-------		
	Ector	1	-------	1	-------		
	Gaines	1	-------	1	-------		
	Harris	-------	1	-------	1	1,335,000	1,627,300
	Howard	-------	1	-------	1		
	Montgomery	-------	1	-------	1		
	Orange	-------	-------	-------	1		
	Terry	-------	1	-------	1		
	Winkler	1	-------	1	-------		
Total rest of State		6	5	6	6	1,335,000	1,627,300
Total Texas		11	12	11	13	2,995,000	3,463,800
Louisiana	Avoyelles	-------	1	-------	1		
	Calcasieu	-------	1	-------	1		
	Evangeline	-------	1	-------	1	1,696,300	1,795,300
	Ouachita	-------	2	-------	2		
	Richland	1	-------	1	-------		
	St. Mary	-------	3	-------	3		
Total Louisiana		1	8	1	8	1,696,300	1,795,300
Arkansas	Union	-------	1	-------	1		
California	Contra Costa	-------	1	-------	1	737,000	842,000
Kansas	Grant	-------	2	-------	2		
Oklahoma	Kay	-------	1	-------	1		
New Mexico	Lea	3	1	3	1	332,000	332,000
Total United States		15	26	15	27	5,760,300	6,433,100

CONSUMPTION AND USES

Domestic sales of carbon black declined 7 percent in 1960. Average loading of carbon black in virgin rubber, which includes both natural and synthetic rubber, decreased from 878 pounds per long ton in 1959 to 857 pounds in 1960. The demand for carbon black for use in ink increased 1 percent in 1960; demand for paint and miscellaneous uses declined 11 percent and 17 percent, respectively. Steel and chemical plants consumed much of the carbon black reported in the miscellaneous category although actual consumption for these uses cannot be disclosed.

TABLE 7.—Carbon black producers of the United States, as of Dec. 31, 1960

State and company	County or parish	Nearest town	Process
Arkansas: Columbian Carbon Co	Union	El Dorado	Furnace.
California: Shell Chemical Co	Contra Costa	Pittsburg	Do.
Kansas:			
Columbian Carbon Co	Grant	Hickok	Do.
United Carbon Co., Inc	do	Ryus	Do.
Louisiana:			
Cabot Corp	Evangeline	Ville Platte	Do.
	St. Mary	Franklin	Do.
Carbon Blacks, Inc	Richland	Rayville	Channel.
Columbian Carbon Co	Avoyelles	Eola	Furnace.
	Ouachita	Hancock	Do.
	St. Mary	Franklin	Do.
Continental Carbon Co	Calcasieu	Westlake	Do.
Thermatomic Carbon Co	Ouachita	Monroe	Do.
United Carbon Co., Inc	St. Mary	Franklin	Do.
New Mexico:			
Columbian Carbon Co	Lea	Eunice	Channel.
Continental Carbon Co	do	do	Do.
	do	do	Furnace.
United Carbon Co., Inc	do	do	Channel.
Oklahoma: Continental Carbon Co	Kay	Ponca City	Furnace.
Texas:			
Cabot Corp	Carson	Skellytown	Channel.
	Gray	Pampa	Furnace.
	Howard	Big Springs	Do.
	Winkler	Kermit	Channel.
Coltexo Corp	Gray	Lefors	Do.
Columbian Carbon Co	Brazoria	Sweeny	Do.
	Gaines	Seagraves	Do.
	Gray	Lefors	Do.
	do	do	Do.
	Montgomery	Conroe	Furnace.
	Terry	Seagraves	Do.
Continental Carbon Co	Moore	Sunray	Do.
J. M. Huber Corp	Harris	Baytown	Do.
	Hutchinson	Borger	Do.
	do	do	Channel.
Phillips Chemical Co	do	do	Furnace.
	do	do	Do.
	do	do	Do.
	Orange	Orange	Do.
Sid Richardson Carbon Co	Ector	Odessa	Channel.
United Carbon Co., Inc	Aransas	Aransas Pass	Do.
	do	do	Furnace.
	Brooks	Falfurrias	Channel.
	Wheeler	Shamrock	Furnace.

TABLE 8.—Sales of carbon black for domestic consumption in the United States, by uses

(Thousand pounds)

Use	1956	1957	1958	1959	1960	Change from 1959 (percent)
Rubber	1,244,651	1,271,562	1,192,162	1,463,239	1,362,912	−7
Ink	42,047	43,153	40,645	47,366	47,980	+1
Paint	13,231	11,951	10,997	13,828	12,270	−11
Miscellaneous	3,100	4,700	7,133	7,816	6,456	−17
Total	1,303,029	1,331,366	1,250,937	1,532,249	1,429,618	−7

STOCKS

Total stocks of carbon black increased 74 million pounds in 1960. Stocks of furnace black rose 70 million pounds, and stocks of channel black increased 4 million pounds. Advances occurred in stocks of all grades of furnace black, but stocks of superabrasion furnace black declined.

VALUE

The Oil, Paint and Drug Reporter, on February 8, 1960, reported that prices of carbon black in carload lots increased 0.75 cent per pound for ordinary rubber grades. Fast-extrusion grades also rose 2.00 cents per pound on October 17, 1960. The average value of furnace black increased from 6.58 cents per pound in 1959 to 6.88 cents in 1960, and channel black rose from 9.20 cents per pound to 10.11 cents per pound in 1960. Value of natural gas used as raw material increased from 9.19 cents per thousand cubic feet in 1959 to 10.05 cents in 1960. Value of liquid hydrocarbon used as feed rose 0.31 cent per gallon over 1959.

TABLE 9.—Producers' stocks of channel- and furnace-type blacks in the United States, Dec. 31, 1956-60

(Thousand pounds)

Year	Furnace									Channel	Total
	SRF [1]	HMF [1]	GPF [1]	FEF [1]	HAF [1]	SAF [1]	ISAF [1]	Thermal	Total		
1956	78,552	16,500	----------	35,374	69,253	(2)	[2] 47,081	[3] 22,270	269,030	78,544	347,574
1957 [4]	75,282	12,336	(5)	35,135	60,242	(2)	[2] 56,118	[3] 28,270	267,383	82,016	349,399
1957 [6]	75,282	10,704	1,632	35,135	60,242	6,241	49,877	[3] 28,270	267,383	82,016	349,399
1958	40,391	6,351	8,867	26,526	53,007	7,045	40,451	23,276	205,914	95,009	300,923
1959	24,917	4,757	4,132	18,413	40,281	6,786	29,044	20,800	149,130	69,763	218,893
1960	43,402	12,050	7,827	23,420	66,325	4,437	39,075	23,032	219,568	73,424	292,992

[1] For explanation, see footnotes to table 4.
[2] SAF included in ISAF.
[3] Includes a small quantity of other furnace grades before 1957.
[4] Old basis, for comparison with previous years.
[5] Included in HMF.
[6] New basis, for comparison with 1958.

TABLE 10.—Prices of carbon black in carlots, f.o.b. plant, 1956-60

(Cents per pound)

Date	Channel blacks		Furnace blacks			
	Ordinary rubber grades [1]		Semi-reinforcing grades (SRF)	High-modulus grades (HMF)	Fast-extrusion grades (FEF)	High-abrasion grades (HAF)
	Bags	Bulk	Bags	Bags	Bags	Bags
Jan. 1, 1956	7.40	7.00	4.50	5.50	6.00	7.90
Jan. 1, 1957	7.40	7.00	4.50	5.50	6.00	7.90
Dec. 9, 1957	7.75	7.25	5.75	6.25	6.75	7.75
Dec. 29, 1958	7.75	7.25	5.75	6.25	6.75	7.75
Dec. 28, 1959	7.75	7.25	5.75	6.25	6.75	7.75
Feb. 8, 1960	8.50	8.00	5.75	6.25	6.75	7.75
Oct. 17, 1960	8.50	8.00	5.75	6.25	8.75	7.75

[1] Chiefly Easy-Processing (EPC) and Medium-Processing (MPC), but also includes Hard-Processing (HPC) and Conductive (CC) channel blacks.

Source: Oil, Paint and Drug Reporter.

FOREIGN TRADE [3]

Imports.—Imports of acetylene black in 1960 amounted to 6,785 thousand pounds, compared with 7,247 thousand pounds in 1959. Virtually all came from Canada. The average value reported by the Census Bureau was 19.2 cents per pound, compared with 18.4 cents in 1959. Carbon black imports increased from 347 thousand pounds in 1959 to 719 thousand pounds in 1960.

Exports.—Exports of carbon black rose 6 percent over 1959. Increases were reported in shipments to countries in South America, Europe, and Asia, whereas exports to countries in North America, Africa, and Oceania declined.

TABLE 11.—Carbon black exported from the United States, in 1960, by months

(Thousand pounds)

Month	Channel	Furnace	Total	Month	Channel	Furnace	Total
January	23,310	37,598	60,908	September	10,361	36,876	47,237
February	10,635	26,574	37,209	October	9,874	29,971	39,845
March	8,920	35,408	44,328	November	14,139	34,963	49,102
April	13,862	41,367	55,229	December	13,443	31,339	44,782
May	8,774	30,769	39,543				
June	10,527	30,319	40,846	Total:			
July	8,630	29,120	37,750	1960	146,066	396,966	543,032
August	13,591	32,662	46,253	1959	164,518	348,625	513,143

Source: Bureau of the Census.

[3] Figures on exports compiled by Mae B. Price and Elsie D. Jackson, Bureau of Mines, from records of the U.S. Department of Commerce.

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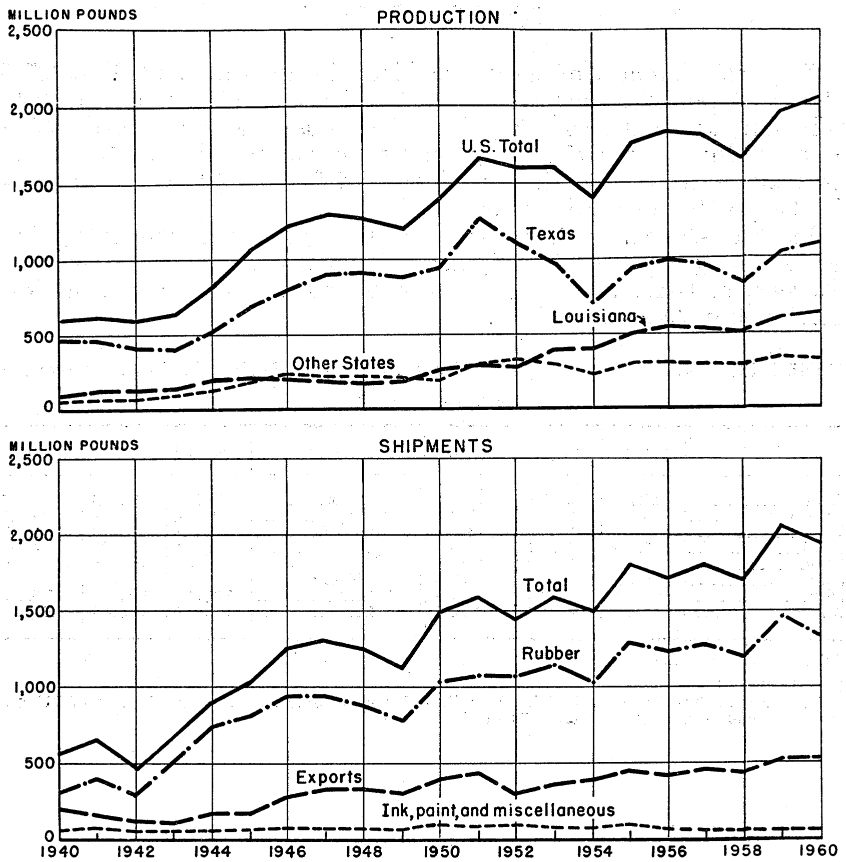

FIGURE 2.—Production and shipments of carbon black, 1940–60.

TABLE 12.—Carbon black exported from the United States, by countries of destination

Country	1958		1959		1960	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
North America:						
Canada	31,266	2,603	38,936	3,231	27,174	2,285
Cuba	2,915	245	3,697	305	2,003	164
Mexico	19,041	1,605	19,420	1,583	20,571	1,728
Other North America	315	34	466	41	950	85
Total	53,537	4,487	62,519	5,160	50,698	4,262

TABLE 12.—Carbon black exported from the United States, by countries of destination—Continued

Country	1958		1959		1960	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
South America:						
Argentina	16,828	1,505	20,295	1,780	20,183	1,768
Brazil	17,635	1,505	13,076	1,073	12,930	1,085
Chile	2,114	191	3,532	308	3,554	313
Colombia	5,663	499	5,855	532	8,769	772
Peru	2,135	187	3,041	278	3,928	356
Uruguay	2,355	191	1,422	122	3,667	307
Venezuela	8,557	758	9,571	859	10,020	906
Other South America	107	10	347	28	315	37
Total	55,394	4,846	57,139	4,980	63,366	5,544
Europe:						
Austria	1,119	85	1,719	120	1,457	119
Belgium-Luxembourg	12,872	1,168	16,035	1,443	13,326	1,222
Denmark	1,321	149	1,446	178	3,229	315
Finland	774	77	1,273	104	738	73
France	77,117	6,925	70,969	6,379	67,981	6,278
Germany, West	21,127	1,840	29,743	2,549	44,503	3,790
Greece	675	56	410	36	267	26
Ireland	310	35	97	15	101	22
Italy	44,920	3,942	52,627	4,539	71,336	6,348
Netherlands	5,706	534	10,334	989	9,950	1,058
Norway	1,574	140	1,965	175	1,852	162
Poland			198	16	1,004	84
Portugal	1,417	121	2,630	216	1,974	171
Spain	8,700	838	10,248	935	9,630	853
Sweden	13,213	1,213	17,325	1,492	14,544	1,320
Switzerland	4,394	455	4,302	481	1,751	190
Trieste	233	16	45	3		
U.S.S.R			275	26	4,496	404
United Kingdom	23,846	2,750	27,187	3,170	29,228	3,563
Yugoslavia	2,323	221	2,633	248	3,284	315
Other Europe			72	8	417	56
Total	221,641	20,565	251,533	23,122	281,068	26,369
Asia:						
India	14,958	1,276	17,785	1,469	22,941	1,939
Indonesia	4,572	448	8,252	739	6,605	584
Israel	3,101	268	5,911	496	4,913	426
Japan	27,115	2,645	37,855	3,621	47,537	4,650
Korea, Republic of	1,784	168	4,252	439	2,386	229
Malaya, Federation of	300	27	631	56	1,026	96
Singapore	433	39	370	36	544	51
Pakistan	316	27	482	44	643	62
Philippines	6,844	611	6,192	550	8,194	755
Taiwan	343	35	1,349	130	1,353	129
Turkey	1,623	135	2,234	190	1,632	139
Other Asia	1,358	131	1,456	130	2,319	220
Total	62,747	5,810	86,769	7,900	100,093	9,280
Africa:						
Union of South Africa	20,994	1,882	26,299	2,321	24,081	2,147
United Arab Republic (Egypt Region)	1,774	144	711	54	1,631	133
Other Africa	412	33	582	53	841	77
Total	23,180	2,059	27,592	2,428	26,553	2,357
Oceania:						
Australia	20,313	1,660	22,973	1,797	16,581	1,376
New Zealand	3,730	321	4,618	411	4,673	412
Total	24,043	1,981	27,591	2,208	21,254	1,788
Grand total	440,542	39,748	513,143	45,798	543,032	49,600

Source: Bureau of the Census.

TABLE 13.—World production of carbon black by countries [1]

(Thousand pounds)

Country [2]	1956	1957	1958	1959	1960
Brazil	----------	----------	18,739	25,353	35,274
France	9,259	8,818	8,818	9,039	[3] 9,700
Germany, West	127,122	149,670	141,429	139,582	(4)
Japan	25,159	30,611	31,662	42,300	55,011
Rumania	30,161	42,044	49,116	49,235	(4)
Taiwan	603	680	(4)	(4)	(4)
United Kingdom	182,784	234,035	243,936	269,069	320,317
United States	1,839,968	1,798,425	1,644,605	1,967,527	2,053,727
Yugoslavia	3,602	4,242	4,934	6,440	8,514

[1] This table incorporates some revisions.
[2] In addition to countries listed, China and Italy produce carbon black but production data are not available. Canada became a producer of carbon black in 1953, with completion in June of an oil-black furnace at Sernia, Ontario, having a capacity of 20 million pounds per year. The capacity was increased to 60 million pounds in 1956. The actual production is not published to avoid disclosing individual company confidential data.
[3] Estimate.
[4] Data not available.

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

Natural Gas

By Ivan F. Avery[1] and Lulie V. Harvey[2]

Contents

GENERAL SUMMARY

MARKETED production of natural gas in the United States totaled 12,771 billion cubic feet, 6 percent more than in 1959. The average value at the wellhead was 14.0 cents per thousand cubic feet, an increase of 1.1 cents per thousand from 1959.

Natural gas was consumed in 47 States, and total consumption was 12,509 billion cubic feet, also an increase from 1959, 6 percent. The average value at the point of consumption was 50.1 cents per thousand cubic feet, an increase of 2.4 cents per thousand.

TABLE 1.—Salient statistics of natural gas in the United States

	1956	1957	1958	1959	1960
Supply:					
Marketed production[1] million cubic feet	10,081,923	10,680,258	[2] 11,030,298	12,046,115	12,771,038
Withdrawn from storage do	452,762	480,981	621,091	668,743	712,658
Imports do	10,380	37,941	135,797	133,990	155,646
Total do	10,545,065	11,199,180	11,787,186	12,848,848	13,639,342
Disposition:					
Consumption do	9,706,878	10,279,775	[2] 10,760,698	11,819,638	12,509,427
Exports do	35,963	41,655	38,719	18,413	11,332
Stored do	589,232	672,377	704,172	787,485	844,352
Lost in transmission, etc. do	212,992	205,373	283,597	223,312	274,231
Total do	10,545,065	11,199,180	11,787,186	12,848,848	13,639,342
Value at wellhead:					
Total thousand dollars	1,083,812	1,201,759	[2] 1,317,492	1,556,800	1,789,970
Average cents per Mcf	10.8	11.3	11.9	12.9	14.0

[1] Comprises gas sold or consumed by products, including losses in transmission, amounts added to storage, and increases in gas in pipelines.
[2] Includes 50 million cubic feet produced in Alaska with a value of $6,000.

[1] Commodity-industry Analyst.
[2] Statistical assistant.

SCOPE OF REPORT

Data on natural gas production, consumption, and value are collected by annual questionnaires sent to oil and gas producers, natural-gasoline-plant operators, gas-pipeline companies, and gas-utility companies. A separate report was filed by the respondent for each State in which he operated.

Volumes are reported at the pressure base selected by the reporting company; however, if the reported pressure base deviates more than 5 percent from 14.65 pounds per square inch absolute at 60° F., it is corrected to this base.

Reports are received covering approximately 75 percent of the gross natural gas production. The large number of respondents and the difficulty of contacting each small producer make direct compilation of total production impractical. The bulk of the output of non-reporting producers is furnished in the purchases of reporting companies. Marketed production for each State equals consumption in the State, plus gas placed in storage, plus shipments to other States, less gas withdrawn from storage, less receipts from other States.

RESERVES

The estimated proved recoverable reserves of natural gas in the United States as of December 31 were 263.8 trillion cubic feet, according to the American Gas Association Committee on Natural Gas Reserves. This was an increase of 1.2 trillion cubic feet during the year—the smallest annual increase since 1954.

Of the total proved reserves of natural gas in the United States, which were located in 30 States, 89 percent was located in Texas, Louisiana, Kansas, Oklahoma, and New Mexico.

GROSS WITHDRAWAL

Gross withdrawal equals marketed production, plus gas repressured, plus vent and waste gas. Gross withdrawal was 15,088 billion cubic feet, 6 percent more than the 14,229 billion cubic feet withdrawn in 1959. The quantity of gas vented and wasted is compiled from data given on the reporting forms, supplemented by estimated waste derived from figures published by the Natural Gas Reserves Committee of the American Gas Association and State conservation bodies. The quantity of gas used in repressuring was 1,754 billion cubic feet, 9 percent more than 1959. Gas vented and wasted decreased 1 percent.

UNDERGROUND STORAGE OF NATURAL GAS

The American Gas Association reports that 8 storage pools and 567 no-longer-producing wells were added to existing underground storage facilities bringing the total of such facilities to 217 storage pools and 9,079 wells—a total capacity of 2.9 trillion cubic feet. The gas in storage reservoirs as of December 31 filled 76 percent of this capacity.

Gross injections to underground storage were 844 billion cubic feet, and withdrawals were 713 billion cubic feet. Both injections and withdrawals were higher than in 1959.

TABLE 2.—Estimated proved recoverable reserves of natural gas in the United States

(Million cubic feet)

State	Reserves as of Dec. 31, 1959 [1]	Changes in reserves during 1960: Extensions and revisions [1]	Discoveries of new fields and new pools in old fields [1]	Net change in underground storage [2]	Net production [3]
Alaska	57, 975	36, 993	13, 000	0	305
Arkansas	1, 422, 817	83, 115	36, 360	211	82, 793
California [4]	8, 593, 447	395, 351	324, 694	30, 875	500, 472
Colorado	2, 496, 159	−474, 828	121, 520	565	100, 662
Illinois	175, 110	8, 900	297	7, 461	18, 633
Indiana	35, 088	1, 001	284	1, 692	3, 945
Kansas	19, 981, 403	128, 848	156, 452	19, 866	666, 345
Kentucky	1, 159, 381	46, 048	9, 020	1, 918	72, 518
Louisiana [4]	59, 853, 920	4, 333, 983	2, 254, 600	0	3, 056, 362
Michigan	515, 403	7, 549	31, 200	56, 057	24, 451
Mississippi	2, 486, 524	31, 804	210, 390	−73	186, 307
Montana	665, 491	−17, 245	0	14, 126	36, 194
Nebraska	132, 719	−3, 057	861	0	12, 695
New Mexico	17, 912, 798	−1, 654, 454	127, 457	−3, 317	778, 760
New York	106, 519	−7, 588	420	1, 662	4, 812
North Dakota	1, 206, 542	−35, 415	0	0	20, 106
Ohio	748, 766	34, 297	9, 250	12, 549	39, 309
Oklahoma	16, 651, 292	975, 342	665, 460	13, 283	993, 975
Pennsylvania	1, 051, 972	191, 836	18, 000	50, 343	119, 671
Texas [4]	120, 475, 783	2, 471, 209	2, 428, 403	16, 787	5, 902, 789
Utah	1, 264, 250	260, 445	63, 734	0	62, 289
Virginia	38, 632	−3, 300	300	0	2, 342
West Virginia	1, 593, 551	318, 967	71, 488	37, 001	189, 882
Wyoming	3, 847, 064	199, 836	93, 719	1, 148	207, 018
Other States [5]	123, 987	3, 203	100	20, 654	7, 815
Total	262, 596, 593	7, 332, 840	6, 637, 009	282, 808	13, 090, 450

State	Reserves as of Dec. 31, 1960: Nonassociated [6]	Associated [7]	Dissolved [8]	Underground storage [9]	Total
Alaska	95, 811	0	11, 852	0	107, 663
Arkansas	957, 514	287, 932	209, 222	5, 042	1, 459, 710
California [4]	2, 509, 684	1, 962, 792	4, 249, 526	121, 893	8, 843, 895
Colorado	1, 294, 053	258, 434	489, 538	729	2, 042, 754
Illinois	9, 349	0	111, 185	52, 601	173, 135
Indiana	1, 100	1, 200	19, 875	11, 945	34, 120
Kansas	18, 735, 589	527, 181	274, 886	82, 568	19, 620, 224
Kentucky	1, 041, 373	0	76, 365	26, 111	1, 143, 849
Louisiana [4]	50, 527, 589	8, 956, 486	3, 902, 066	0	63, 386, 141
Michigan	116, 015	71, 793	56, 634	341, 316	585, 758
Mississippi	1, 906, 135	340, 020	290, 718	5, 465	2, 542, 338
Montana	465, 058	29, 138	76, 799	55, 183	626, 178
Nebraska	93, 277	8, 673	15, 878	0	117, 828
New Mexico	11, 214, 132	2, 753, 119	1, 592, 049	44, 424	15, 603, 724
New York	36, 841	0	138	59, 222	96, 201
North Dakota	9, 453	340, 400	801, 168	0	1, 151, 021
Ohio	326, 987	0	89, 251	349, 315	765, 553
Oklahoma	12, 275, 573	1, 943, 428	2, 973, 501	118, 900	17, 311, 402
Pennsylvania	714, 941	0	22, 940	454, 599	1, 192, 480
Texas [4]	78, 214, 180	27, 137, 031	14, 077, 131	61, 051	119, 489, 393
Utah	1, 007, 349	31, 476	487, 315	0	1, 526, 140
Virginia	33, 290	0	0	0	33, 290
West Virginia	1, 472, 197	0	63, 633	295, 295	1, 831, 125
Wyoming	3, 197, 676	157, 435	558, 066	21, 572	3, 934, 749
Other States [5]	48, 172	0	15, 184	76, 773	140, 129
Total	186, 303, 338	44, 806, 538	30, 464, 920	2, 184, 004	263, 758, 800

[1] Excludes gas loss due to natural gas liquids recovery.
[2] Net difference between gas stored in and gas withdrawn from underground storage reservoirs, including adjustments and native gas transferred from other reserves categories.
[3] Net production equals gross withdrawals less gas injected into producing reservoirs. Changes in underground storage and gas loss due to natural gas liquids recovery are excluded. Fourth quarter production estimated in some instances.
[4] Includes offshore reserves.
[5] Includes Alabama, Arizona, Florida, Iowa, Maryland, and Missouri.
[6] Free gas not in contact with crude oil in reservoirs and free gas in contact with oil, when production of such gas is not significantly affected by production of crude oil.
[7] Free gas in contact with crude oil in reservoir where production of such gas is significantly affected by production of crude oil.
[8] Gas in solution with crude oil in reservoirs.
[9] Gas held in underground reservoirs (including native and net-injected gas) for storage purposes.

Source: Committee on Natural Gas Reserves, American Gas Association.

TABLE 3.—Gross withdrawals and disposition of natural gas in the United States

(Million cubic feet)

State	Gross withdrawals [1]			Disposition		
	From gas wells	From oil wells	Total	Marketed production [2]	Repressuring	Vented and wasted [3]
1959:						
Arkansas	32,000	40,800	72,800	40,674	27,488	4,638
California	150,000	607,000	757,000	485,655	267,062	4,283
Colorado	50,000	114,000	164,000	99,899	43,125	20,976
Illinois	2,600	17,000	19,600	13,739	3	5,858
Indiana	300	3,500	3,800	484		3,316
Kansas	585,000	62,000	647,000	604,410	457	42,133
Kentucky	70,000	4,000	74,000	73,504		496
Louisiana	2,442,000	514,000	2,956,000	2,670,271	186,599	99,130
Maryland	4,373		4,373	4,373		
Michigan	16,000	5,500	21,500	18,916	2,022	562
Mississippi	143,000	90,000	233,000	162,095	67,044	3,861
Montana	24,500	8,500	33,000	30,743	1,154	1,103
Nebraska	7,000	8,500	15,500	13,128	619	1,753
New Mexico	472,000	286,000	758,000	739,660	7,086	11,254
New York	2,900	200	3,100	2,915		185
North Dakota	1,500	18,000	19,500	17,915		1,585
Ohio	32,000	4,500	36,500	34,664	92	1,744
Oklahoma	601,000	495,000	1,096,000	811,508	102,022	182,470
Pennsylvania	107,000	3,000	110,000	99,366	1,487	9,147
Texas	5,037,000	1,714,000	6,751,000	5,718,993	877,487	154,520
Utah	17,000	34,800	51,800	38,921	5,937	6,942
Virginia	2,300		2,300	2,280		20
West Virginia	202,000	3,000	205,000	204,633	26	341
Wyoming	100,000	94,000	194,000	156,978	22,399	14,623
Other States [4]	281	218	499	391		108
Total	10,101,754	4,127,518	14,229,272	12,046,115	1,612,109	571,048
1960:						
Arkansas	45,700	41,100	86,800	55,451	27,640	3,709
California	182,000	647,300	829,300	517,535	308,916	2,849
Colorado	52,700	99,200	151,900	107,404	38,465	6,031
Illinois	2,400	17,300	19,700	11,666	145	7,889
Indiana	300	3,600	3,900	342		3,558
Kansas	617,000	58,000	675,000	634,410	440	40,150
Kentucky	72,900	3,000	75,900	75,329		571
Louisiana	2,691,000	622,000	3,313,000	2,988,414	219,441	105,145
Maryland	4,065		4,065	4,065		
Michigan	18,900	8,000	26,900	20,790	2,087	4,023
Mississippi	150,700	99,000	249,700	172,478	62,199	15,023
Montana	29,700	8,300	38,000	33,418	1,038	3,544
Nebraska	8,300	9,000	17,300	15,258	91	1,951
New Mexico	532,300	288,700	821,000	798,928	9,359	12,713
New York	4,900	200	5,100	4,990		110
North Dakota	1,000	23,800	24,800	19,483	2,486	2,831
Ohio	34,400	5,000	39,400	36,074	65	3,261
Oklahoma	639,400	494,000	1,133,400	824,266	115,467	193,667
Pennsylvania	116,400	3,500	119,900	113,928	156	5,816
Texas	5,307,600	1,657,300	6,964,900	5,892,704	941,004	131,192
Utah	15,500	46,700	62,200	51,040	5,826	5,334
Virginia	2,227		2,227	2,227		
West Virginia	205,900	3,200	209,100	208,757	26	317
Wyoming	117,800	96,000	213,800	181,610	19,145	13,045
Other States [4]	334	285	619	471		148
Total	10,853,426	4,234,485	15,087,911	12,771,038	1,753,996	562,877

[1] Marketed production plus quantities used in repressuring, vented, and wasted.
[2] Comprises gas sold or consumed by producers, including losses in transmission, quantities added to storage, and increases in gas in pipelines.
[3] Partly estimated: Includes direct waste on producing properties and residue blown to the air.
[4] Alabama, Alaska, Arizona, Florida, Missouri, South Dakota, and Tennessee.

TABLE 4.—Marketed production of natural gas in the United States[1]

State	Quantity (million cubic feet)					Change from 1959 (percent)	Estimated value at wells (thousand dollars)	
	1956	1957	1958	1959	1960		1959	1960
Alabama	42	190	323	172	57	−66.9	17	4
Alaska	----------	----------	50	133	246	85.0	16	30
Arizona	21	----------	----------	----------	----------	----------	----------	----------
Arkansas	30, 162	31, 327	32, 890	40, 674	55, 451	36. 3	3, 539	6, 599
California	504, 458	492, 338	465, 582	485, 655	517, 535	6. 6	119, 471	138, 182
Colorado	54, 205	95, 259	82, 464	99, 899	107, 404	7. 5	10, 989	12, 781
Florida	35	34	35	34	30	−11. 8	5	5
Illinois	6, 177	9, 647	12, 983	13, 739	11, 666	−15. 1	1, 910	1, 458
Indiana	791	671	378	384	342	−29. 3	92	61
Kansas	526, 091	586, 690	561, 816	604, 410	634, 410	5. 0	72, 529	74, 226
Kentucky	73, 687	70, 024	72, 248	73, 504	75, 329	2. 5	17, 420	18, 380
Louisiana	1, 886, 302	2, 078, 901	2, 451, 587	2, 670, 271	2, 988, 414	11. 9	411, 222	511, 019
Maryland	4, 619	4, 649	4, 266	4, 373	4, 065	−7. 0	1, 181	1, 081
Michigan	10, 911	9, 122	14, 243	18, 916	20, 790	9. 9	4, 350	4, 449
Mississippi	185, 137	169, 967	160, 143	162, 095	172, 478	6. 4	25, 125	32, 426
Missouri	12	12	----------	----------	75	----------	----------	19
Montana	25, 847	28, 638	27, 989	30, 743	33, 418	8. 7	2, 306	2, 373
Nebraska	13, 541	14, 249	11, 405	13, 128	15, 258	16. 2	2, 087	2, 670
New Mexico	626, 340	723, 004	761, 446	739, 660	798, 928	8. 0	73, 966	85, 485
New York	4, 098	2, 869	2, 808	2, 915	4, 990	71. 2	889	1, 542
North Dakota	11, 725	15, 450	17, 325	17, 915	19, 483	8. 8	1, 774	2, 221
Ohio	25, 368	30, 384	31, 786	34, 664	36, 074	4. 1	8, 042	8, 477
Oklahoma	678, 603	719, 794	696, 504	811, 508	824, 266	1. 6	81, 151	98, 088
Pennsylvania	104, 508	101, 801	95, 869	99, 366	113, 928	14. 7	29, 015	36, 229
Tennessee	45	38	54	52	63	21. 2	9	11
Texas	4, 999, 889	5, 156, 215	5, 178, 073	5, 718, 993	5, 892, 704	3. 0	617, 651	665, 876
Utah	17, 268	16, 824	19, 247	38, 921	51, 040	31. 1	5, 527	9, 187
Virginia	2, 926	2, 465	2, 521	2, 280	2, 227	−2. 3	597	604
West Virginia	204, 717	202, 440	204, 581	204, 633	208, 757	2. 0	53, 205	54, 694
Wyoming	84, 398	117, 256	121, 682	156, 978	181, 610	15. 7	12, 715	21, 793
Total	10, 081, 923	10, 680, 258	11, 030, 298	12, 046, 115	12, 771, 038	6. 0	1, 556, 800	1, 789, 970

[1] Comprises gas either sold or consumed by producers, including losses in transmission, quantities added to storage and increases of gas in pipelines.

TABLE 5.—Natural gas stored underground in and withdrawn from storage fields

(Million cubic feet)

State	1959			1960		
	Total stored	Total withdrawn	Net stored	Total stored	Total withdrawn	Net stored
Arkansas	213	388	−175	2, 076	278	1, 798
California	46, 756	39, 045	7, 711	46, 753	36, 035	10, 718
Delaware	159	29	130	341	----------	341
Illinois	15, 532	14, 236	1, 296	21, 419	15, 756	5, 663
Indiana	9, 656	5, 882	3, 774	10, 219	8, 186	2, 033
Iowa	26, 096	9, 185	16, 911	31, 423	12, 494	18, 929
Kansas	33, 193	31, 125	2, 068	38, 808	31, 333	7, 475
Kentucky	12, 667	10, 846	1, 821	13, 871	15, 004	−1, 133
Michigan	120, 664	112, 556	8, 108	130, 814	119, 273	11, 541
Mississippi	3, 712	2, 679	1, 033	3, 018	3, 552	−534
Missouri	4, 245	1, 727	2, 518	5, 690	3, 831	1, 859
Montana	6, 859	3, 206	3, 653	9, 574	2, 601	6, 973
Nebraska	----------	86	−86	----------	----------	----------
New Mexico	5, 141	6, 880	−1, 739	3, 824	6, 175	−2, 351
New York	43, 414	26, 853	16, 561	23, 879	29, 373	−5, 494
Ohio	112, 832	87, 511	25, 321	120, 622	102, 846	17, 776
Oklahoma	20, 102	22, 092	−1, 990	23, 834	23, 032	802
Pennsylvania	168, 111	159, 220	8, 891	177, 491	149, 128	28, 363
Texas	26, 172	18, 098	8, 074	23, 362	22, 101	1, 261
Utah	----------	----------	----------	44	13	31
Virginia	----------	----------	----------	19	----------	19
West Virginia	128, 536	113, 276	15, 260	153, 748	128, 600	25, 148
Wisconsin	----------	----------	----------	----------	----------	----------
Wyoming	3, 425	3, 823	−398	3, 523	3, 047	476
Total	787, 485	668, 743	118, 742	844, 352	712, 658	131, 694

TABLE 6.—Underground storage statistics, Dec. 31, 1960

State	Number of pools	Number of active wells	Total gas in storage reservoirs (million cubic feet)	Total reservoir capacity (million cubic feet)
Arkansas	2	17	5,042	5,204
California	6	140	121,893	270,920
Colorado	1	5	728	3,000
Illinois	5	85	52,601	104,992
Indiana	7	302	11,945	15,164
Iowa	2	105	65,534	65,534
Kansas	16	731	82,568	101,514
Kentucky	7	371	26,111	24,684
Michigan	20	1,352	341,316	464,877
Mississippi	2	23	5,465	6,702
Missouri	2	39	11,239	11,239
Montana	4	108	55,183	96,452
New Mexico	4	57	44,424	77,872
New York	13	602	59,222	65,519
Ohio	17	2,130	349,315	437,392
Oklahoma	7	73	118,900	175,534
Pennsylvania	53	1,866	454,599	476,928
Texas	8	75	61,051	59,975
West Virginia	39	990	295,295	343,036
Wyoming	2	8	21,572	62,972
Total	217	9,079	2,184,003	2,869,510

Source: American Gas Association.

TABLE 7.—Gas wells and condensate wells in the United States

State	Drilled during 1959 [1] [2]	Producing Dec. 31, 1959	Drilled during 1960 [1]	Producing Dec. 31, 1960
Alabama	----------	4	----------	4
Alaska	3	2	3	2
Arizona	1	----------	1	1
Arkansas	41	320	38	370
California	73	569	115	652
Colorado	85	318	125	466
Illinois	9	35	8	45
Indiana	11	350	12	350
Kansas	183	5,700	201	6,003
Kentucky	289	4,690	264	4,829
Louisiana	557	5,000	617	6,479
Maryland	1	38	----------	38
Michigan	54	230	26	154
Mississippi	32	300	39	400
Missouri	----------	----------	----------	9
Montana	11	1,176	8	999
Nebraska	1	50	2	53
New Mexico	411	5,000	420	6,047
New York	8	920	28	1,000
North Dakota	5	28	1	28
Ohio	297	6,700	260	7,063
Oklahoma	511	5,300	506	5,800
Pennsylvania	327	16,500	269	16,350
Tennessee	----------	25	2	30
Texas	1,466	16,750	1,539	18,612
Utah	16	37	23	35
Virginia	10	53	8	92
West Virginia	550	12,740	686	14,500
Wyoming	77	390	57	350
Total	5,029	83,225	5,258	90,761

[1] From Oil and Gas Journal.
[2] Revised.

TABLE 8.—Marketed production, interstate shipments, and total consumption of natural gas in the United States

(Million cubic feet)

Census regions and States	Marketed production		Interstate movements		Transmission loss and unaccounted for	Change in underground storage	Consumption
	Quantity	Average value at wellhead (cents per M.c.f.)	Quantity shipped	Quantity received			
New England							
Connecticut	----------	----------	----------	29,590	1,137	----------	28,453
Massachusetts	----------	----------	----------	80,026	2,140	----------	77,886
New Hampshire	----------	----------	----------	2,889	37	----------	2,852
Rhode Island	----------	----------	----------	11,707	−132	----------	11,839
Total:							
1960	----------	----------	----------	124,212	3,182	----------	121,030
1959	----------	----------	----------	114,904	2,544	----------	112,360
Middle Atlantic:							
New Jersey	----------	----------	----------	150,276	11,018	----------	139,258
New York	4,990	30.9	463	424,243	14,804	−5,494	419,460
Pennsylvania	113,928	31.8	55,962	498,607	7,422	28,363	520,788
Total:							
1960	118,918	31.8	56,425	1,073,126	33,244	22,869	1,079,506
1959	102,281	29.2	99,052	1,073,141	35,940	25,452	1,014,978
East North Central:							
Illinois	11,666	12.5	523	537,768	6,699	5,663	536,549
Indiana	342	18.8	234	218,305	3,529	2,033	212,851
Michigan	20,790	21.4	----------	371,540	12,258	11,541	368,531
Ohio	36,074	23.5	115	691,833	11,447	17,776	698,569
Wisconsin	----------	----------	----------	95,768	5,148	----------	90,620
Total:							
1960	68,872	21.0	872	1,915,214	39,081	37,013	1,907,120
1959	67,803	21.2	2,234	1,767,833	19,883	38,499	1,775,020
West North Central:							
Iowa	----------	----------	----------	211,129	5,062	18,929	187,138
Kansas	634,410	11.7	504,626	261,846	11,853	7,475	372,302
Minnesota	----------	----------	----------	179,625	−202	----------	179,827
Missouri	75	25.0	----------	267,445	4,289	1,859	261,372
Nebraska	15,258	17.5	292	124,820	758	----------	139,028
North Dakota	19,483	11.4	4,425	2,765	549	----------	17,274
South Dakota	----------	----------	----------	24,882	349	----------	24,533
Total:							
1960	669,226	11.8	509,343	1,072,512	22,658	28,263	1,181,474
1959	635,453	12.0	466,362	1,022,929	17,840	21,411	1,152,769
South Atlantic:							
Delaware	----------	----------	----------	9,511	135	341	9,035
District of Columbia	----------	----------	----------	19,370	1,228	----------	18,142
Florida	30	16.2	----------	139,524	1,679	----------	137,875
Georgia	----------	----------	----------	185,961	3,874	----------	182,087
Maryland	4,065	26.6	1,528	64,685	2,299	----------	64,923
North Carolina	----------	----------	----------	47,376	1,934	----------	45,442
South Carolina	----------	----------	----------	60,568	2,036	----------	58,532
Virginia	2,227	27.1	2,220	69,682	3,489	19	66,181
West Virginia	208,757	26.2	158,271	153,725	−906	25,148	179,969
Total:							
1960	215,079	26.2	162,019	750,402	15,768	25,508	762,186
1959	211,320	26.0	243,284	751,405	6,525	15,390	697,526
East South Central:							
Alabama	57	7.3	165	186,119	1,893	----------	184,118
Kentucky	75,329	24.4	50,576	139,207	5,383	−1,133	159,710
Mississippi	172,478	18.8	156,288	176,741	4,601	−534	188,864
Tennessee	63	17.5	----------	159,869	4,309	----------	155,623
Total:							
1960	247,927	20.5	207,029	661,936	16,186	−1,667	688,315
1959	235,823	18.0	142,078	572,165	3,848	2,854	659,208

TABLE 8.—Marketed production, interstate shipments, and total consumption of natural gas in the United States—Continued

(Million cubic feet)

Census regions and States	Marketed production		Interstate movements		Transmission loss and unaccounted for	Change in underground storage	Consumption
	Quantity	Average value at wellhead (cents per Mc.f.)	Quantity shipped	Quantity received			
West South Central:							
Arkansas	55,451	11.9	2,065	175,547	10,619	1,798	216,516
Louisiana	2,988,414	17.1	2,232,023	205,274	13,727		947,938
Oklahoma	824,266	11.9	450,685	24,619	14,356	802	383,042
Texas	5,892,704	11.3	2,952,291	102,740	60,725	1,261	2,981,167
Total:							
1960	9,760,835	13.1	5,637,064	508,180	99,427	3,861	4,528,663
1959	9,241,446	12.0	5,312,111	516,222	82,978	5,909	4,356,670
Mountain:							
Arizona				136,324	830		135,494
Colorado	107,404	11.9	42,413	148,339	5,684		207,646
Idaho				21,556	−450		22,006
Montana	33,418	7.1	4,487	34,617	2,006	6,973	54,569
Nevada				12,585	138		12,447
New Mexico	798,928	10.7	615,280	76,360	−4,050	−2,351	266,409
Utah	51,040	18.0	26,959	53,007	1,407	31	75.650
Wyoming	181,610	12.0	126,713	8,861	3,647	476	59,635
Total:							
1960	1,172,400	11.2	815,852	491,649	9,212	5,129	833,856
1959	1,066,201	9.9	777,046	519,838	22,982	1,516	784,495
Pacific:							
Alaska	246	12.2			17		229
California	517,535	26.7		838,824	34,388	10,718	1,311,253
Oregon				30,739	−122		30,861
Washington				66,124	1,190		64,934
Total:							
1960	517,781	26.7		935,687	35,473	10,718	1,407,277
1959	485,788	24.6		819,307	30,772	7,711	1,266,612
Total United States:							
1960	12,771,038	14.0	7,388,604	7,532,918	274,231	131,694	12,509,427
1959	12,046,115	12.9	7,042,167	7,157,744	223,312	118,742	11,819,638
			Imports	Exports			
Foreign:							
Canada			108,657	5,759			
Mexico			46,989	5,573			
Total movements:							
1960			7,544,250	7,544,250			
1959			7,176,157	7,176,157			

TABLE 9.—Natural gas moving interstate, imports, and exports

(Million cubic feet)

Consuming regions and countries or States	Quantity received	Producing region: Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Foreign imports
New England:									
Connecticut	29, 590		13			898	27, 864		815
Massachusetts	80, 026		37			2, 487	75, 245		2, 257
New Hampshire	2, 889						2, 889		
Rhode Island	11, 707		7			497	10, 750		453
Total	124, 212		57			3, 882	116, 748		3, 525
Middle Atlantic:									
New Jersey	150, 276	169	39		64	3, 022	144, 259		2, 723
New York	424, 243	52, 527	54		4, 395	5, 064	358, 381		3, 822
Pennsylvania	498, 607	1, 890	209		36, 840	18, 355	428, 284		13, 029
Total	1, 073, 126	54, 586	302		41, 299	26, 441	930, 924		19, 574
East North Central:									
Illinois	537, 768		234	39, 186		163	496, 744	901	540
Indiana	218, 305		13	30, 519		232	186, 566	121	854
Michigan	371, 540			40, 952		124	329, 877	157	430
Ohio	691, 833	977	151	30, 650	105, 471	32, 711	511, 231	122	10, 520
Wisconsin	95, 768			2, 538			81, 341	111	11, 778
Total	1, 915, 214	977	398	143, 845	105, 471	33, 230	1, 605, 759	1, 412	24, 122
West North Central:									
Iowa	211, 129			62, 105			141, 090	7, 934	
Kansas	261, 846			439			253, 724	7, 683	
Minnesota	179, 625			77, 882			93, 107	8, 086	550
Missouri	267, 445			83, 502		265	182, 911	168	599
Nebraska	124, 820			56, 717			52, 537	15, 566	
North Dakota	2, 765			330			1	2, 345	89
South Dakota	24, 882			7, 917			8, 829	8, 136	
Total	1, 072, 512			288, 892		265	732, 199	49, 918	1, 238
South Atlantic:									
Delaware	9, 511					17	9, 480		14
District of Columbia	19, 370	83			1, 575	1, 269	16, 438		5
Florida	139, 524					9, 646	129, 878		
Georgia	185, 961					50, 163	135, 785		13
Maryland	64, 685	464			61	4, 255	59, 877		28
North Carolina	47, 376					39	47, 311		26
South Carolina	60, 568					10, 723	49, 832		13
Virginia	69, 682				10, 216	4, 374	55, 083		9
West Virginia	153, 725	315	115		2, 061	12, 999	138, 173		62
Total	750, 402	862	115		13, 913	93, 485	641, 857		170
East South Central:									
Alabama	186, 119					44, 436	141, 669		14
Kentucky	139, 207				1, 336	508	136, 321		1, 042
Mississippi	176, 741					1, 066	174, 949		726
Tennessee	159, 869					224	158, 524		1, 121
Total	661, 936				1, 336	46, 234	611, 463		2, 903
West South Central:									
Arkansas	175, 547					82	174, 910		555
Louisiana	205, 274					3, 410	199, 420		2, 444
Oklahoma	24, 619			2, 708			21, 214	697	
Texas	102, 740			157			68, 109	29, 530	4, 944
Total	508, 180			2, 865		3, 492	463, 653	30, 227	7, 943

TABLE 9.—Natural gas moving interstate, imports, and exports—Continued

(Million cubic feet)

Consuming regions and countries or States	Quantity received	Producing region: Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Foreign imports
Mountain:									
Arizona	136,324	------	------	3	------	------	56,311	80,010	------
Colorado	148,339	------	------	66,540	------	------	38,853	42,946	------
Idaho	21,556	------	------	------	------	------	------	15,350	6,206
Montana	34,617	------	------	3,022	------	------	------	14,874	16,721
Nevada	12,585	------	------	------	------	------	5,158	7,427	------
New Mexico	76,360	------	------	4	------	------	63,306	13,050	------
Utah	53,007	------	------	------	------	------	------	53,007	------
Wyoming	8,861	------	------	2,158	------	------	904	5,799	------
Total	491,649	------	------	71,727	------	------	164,532	232,463	22,927
Pacific:									
California	838,824	------	------	93	------	------	362,390	476,341	------
Oregon	30,739	------	------	------	------	------	------	23,619	7,120
Washington	66,124	------	------	------	------	------	------	------	66,124
Total	935,687	------	------	93	------	------	362,390	499,960	73,244
Total United States	7,532,918	56,425	872	507,422	162,019	207,029	5,629,525	813,980	155,646
Foreign:									
Canada	5,759	------	------	------	------	------	3,968	1,791	------
Mexico	5,573	------	------	1,921	------	------	3,571	81	------
Total exports	11,332	------	------	1,921	------	------	7,539	1,872	------
Total	7,544,250	56,425	872	509,343	162,019	207,029	5,637,064	815,852	155,646

TABLE 10.—Consumption of natural gas in the United States [1]

State	Quantity (million cubic feet)					Change from 1959 (percent)	Estimated value at points of consumption (thousand dollars)	
	1956	1957	1958	1959	1960		1959	1960
Alabama	160,261	165,772	172,406	178,595	184,118	3.1	85,939	96,355
Alaska				133	229	72.2	21	30
Arizona	105,860	105,536	105,034	112,722	135,494	20.2	46,487	57,521
Arkansas	196,297	201,306	202,361	218,528	216,516	−0.9	59,686	88,946
California	1,021,002	1,091,236	1,078,855	1,180,331	1,311,253	11.1	618,513	729,391
Colorado	145,640	176,936	165,099	196,057	207,646	5.9	78,750	78,502
Connecticut	18,109	20,328	27,884	25,875	28,453	10.0	43,051	43,040
Delaware	5,824	6,014	8,301	9,459	9,035	−4.5	8,952	9,790
District of Columbia	15,833	15,701	17,594	17,123	18,142	6.0	25,164	26,902
Florida	35,322	38,871	44,174	91,490	137,875	50.7	52,049	69,736
Georgia	148,567	154,778	164,114	180,342	182,087	1.0	92,575	111,724
Idaho	765	10,733	15,903	19,641	22,006	12.0	9,491	11,787
Illinois	417,443	422,840	452,006	518,111	536,549	3.6	367,741	401,613
Indiana	140,135	145,179	154,583	171,158	212,851	24.4	116,636	133,217
Iowa	147,892	154,964	159,982	182,827	187,138	2.4	96,020	105,196
Kansas	324,335	343,833	362,280	380,241	372,302	−2.1	110,841	114,440
Kentucky	126,580	132,436	136,990	147,993	159,710	7.9	76,919	88,752
Louisiana	839,393	840,331	931,203	893,369	947,938	6.1	190,598	215,251
Maryland	47,553	51,177	57,328	60,674	64,923	7.0	79,254	88,563
Massachusetts	50,691	56,626	67,602	72,994	77,886	6.7	117,165	132,418
Michigan	243,465	272,353	298,104	332,756	368,531	10.8	276,011	294,713
Minnesota	136,831	147,732	149,042	161,390	179,827	11.4	95,690	118,243
Mississippi	145,353	148,279	157,169	183,158	188,864	3.1	60,904	68,284
Missouri	219,424	223,528	241,239	255,095	261,372	2.5	134,337	147,351
Montana	47,690	52,200	51,825	52,183	54,569	4.6	21,711	22,717
Nebraska	109,265	116,326	114,661	132,651	139,028	4.8	61,318	66,130
Nevada	6,676	8,666	8,826	10,450	12,447	19.1	7,515	9,004
New Hampshire	1,445	1,787	2,421	2,480	2,852	15.0	3,904	4,658
New Jersey	90,092	100,483	119,946	132,984	139,258	4.7	186,658	205,564
New Mexico	229,821	243,800	251,518	272,922	266,409	−2.4	46,714	53,441
New York	268,408	299,153	343,326	379,928	419,460	10.4	503,262	532,568
North Carolina	16,579	19,533	23,519	32,685	45,442	39.0	26,822	33,514
North Dakota	10,428	13,753	15,639	16,981	17,274	1.7	5,698	6,844
Ohio	561,557	583,753	618,022	670,618	698,569	4.2	444,549	491,643
Oklahoma	358,930	387,277	342,080	379,178	383,042	1.0	96,413	100,109
Oregon	4,473	18,227	22,752	27,498	30,861	12.2	21,888	23,042
Pennsylvania	431,325	445,813	465,732	502,066	520,788	3.7	392,276	418,015
Rhode Island	6,242	8,139	9,940	11,011	11,839	7.5	18,057	19,156
South Carolina	44,467	39,741	39,678	54,363	58,532	7.7	36,115	34,087
South Dakota	18,002	18,251	19,535	23,584	24,533	4.0	13,111	14,778
Tennessee	126,815	130,601	142,860	149,462	155,623	4.1	72,856	81,254
Texas	2,323,847	2,455,528	2,555,541	2,865,595	2,981,167	4.0	531,885	577,582
Utah	54,669	57,004	55,706	61,401	75,650	23.2	27,927	33,825
Virginia	43,362	48,527	56,052	59,842	66,181	10.6	60,552	68,420
Washington	5,224	40,108	53,063	58,650	64,934	10.7	33,394	40,360
West Virginia	161,246	159,520	164,347	191,548	179,969	−6.0	91,382	97,092
Wisconsin	48,188	59,592	67,596	82,377	90,620	10.0	81,158	89,572
Wyoming	45,552	45,504	46,810	59,119	59,635	0.9	13,733	14,600
Total	9,706,878	10,279,775	10,760,648	11,819,638	12,509,427	5.8	5,641,692	6,269,740

[1] Includes volume of natural gas which is distributed as a component of mixed gas.

TABLE 11.—Residential and commercial consumption of natural gas in the United States[1]

	Residential				Commercial				Total			
	Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption: Total (thousand dollars)	Value at point of consumption: Average (cents per M c.f.)	Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption: Total (thousand dollars)	Value at point of consumption: Average (cents per M c.f.)	Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption: Total (thousand dollars)	Value at point of consumption: Average (cents per M c.f.)
Alabama	496	40,836	44,820	109.8	45	17,486	11,668	66.7	541	58,322	56,488	96.9
Alaska	(2)	170	23	13.5	----	----	----	----	(2)	170	23	13.5
Arizona	282	27,408	21,914	80.0	31	25,286	10,475	41.4	313	52,694	32,389	61.5
Arkansas	271	33,260	21,718	65.3	40	17,161	8,486	49.4	311	50,421	30,204	59.9
California	4,252	364,804	348,175	95.4	323	108,862	73,366	67.4	4,575	473,666	421,541	89.0
Colorado	350	52,295	35,275	67.5	47	28,498	15,889	55.8	397	80,793	51,164	63.3
Connecticut	356	15,996	29,323	183.3	24	3,194	5,367	168.0	380	19,190	34,690	180.8
Delaware	60	3,812	6,662	174.8	3	566	906	160.1	63	4,378	7,568	172.9
District of Columbia and Maryland	683	54,619	85,154	155.9	54	11,623	16,659	143.3	737	66,242	101,813	153.7
Florida	241	6,380	18,888	296.1	21	6,979	10,105	144.8	262	13,359	28,993	217.0
Georgia	513	55,843	55,787	99.9	44	21,396	14,616	68.3	557	77,239	70,403	91.1
Idaho	22	2,181	2,792	128.0	5	2,794	2,484	88.9	27	4,975	5,276	106.1
Illinois	2,177	232,118	263,638	113.6	121	47,252	39,597	83.8	2,298	279,370	303,235	108.5
Indiana	729	76,003	70,643	92.9	67	20,042	17,143	85.5	796	96,045	87,786	91.4
Iowa	527	58,430	54,923	94.0	59	27,863	18,746	67.3	586	86,293	73,669	85.4
Kansas	537	73,490	41,247	56.1	71	41,175	22,188	53.9	608	114,665	63,435	55.3
Kentucky	398	63,009	49,674	78.8	39	18,264	12,585	68.9	437	81,273	62,259	76.6
Louisiana	681	55,799	36,539	65.5	54	23,483	9,210	39.2	735	79,282	45,749	57.7
Massachusetts	942	45,015	98,016	217.7	56	10,238	17,917	175.0	998	55,253	115,933	209.8
Michigan	1,426	201,977	192,641	95.4	122	43,001	34,326	79.8	1,548	244,978	226,967	92.6
Minnesota	493	61,422	70,995	115.6	35	20,329	16,464	81.0	528	81,751	87,459	107.0
Mississippi	254	24,029	21,414	89.1	35	15,171	7,787	51.3	289	39,200	29,201	74.5
Missouri	770	111,112	88,287	79.5	64	32,682	23,506	71.9	834	143,794	111,793	77.7
Montana	108	16,918	11,173	66.0	13	11,885	5,515	46.4	121	28,803	16,688	57.9
Nebraska	289	39,497	32,839	83.1	38	21,937	12,633	57.6	327	61,434	45,472	74.0
Nevada	14	1,935	2,281	117.9	2	869	841	96.7	16	2,804	3,122	111.3
New Hampshire	31	1,692	3,259	192.6	2	501	884	176.4	33	2,193	4,143	188.9
New Jersey	1,400	75,118	159,950	212.9	100	10,330	18,402	178.1	1,500	85,448	178,352	208.7
New Mexico	162	20,358	16,132	79.2	19	9,018	4,316	47.9	181	29,376	20,448	69.6
New York	3,786	224,601	351,524	156.5	274	63,008	93,732	148.8	4,060	287,609	445,256	154.8
North Carolina	125	8,558	12,452	145.5	17	3,706	4,846	130.8	142	12,264	17,298	141.0
North Dakota	30	3,819	2,997	78.5	4	2,850	1,605	56.3	34	6,669	4,602	69.0
Ohio	2,061	361,839	284,726	78.7	163	107,915	85,007	78.8	2,224	469,754	369,733	78.7
Oklahoma	551	59,801	42,256	70.7	59	28,827	11,845	41.1	610	88,628	54,101	61.0
Oregon	87	6,787	10,312	151.9	12	3,106	4,464	143.7	99	9,893	14,776	149.4
Pennsylvania	2,045	232,046	248,477	107.1	122	56,134	48,169	85.8	2,167	288,180	296,646	102.9

Rhode Island	149	6,711	13,609	202.8	8	1,694	2,600	153.5	157	8,405	16,209	192.8
South Carolina	117	6,846	10,213	149.2	14	4,662	4,652	99.8	131	11,508	14,865	129.2
South Dakota	57	7,664	7,377	96.3	7	7,215	4,589	63.6	64	14,879	11,966	80.4
Tennessee	298	33,869	32,093	94.8	40	24,253	17,155	70.7	338	58.122	49,248	84.7
Texas	1,909	171,670	130,890	76.2	194	59,728	30,170	50.5	2,103	231,398	161,060	69.6
Utah	153	22,607	16,609	73.5	19	10,128	5,516	54.5	172	32,735	22,125	67.6
Virginia	337	26,909	43,212	160.6	28	11,336	12,130	107.0	365	38,245	55,342	144.7
Washington	90	8,001	11,964	149.5	19	6,477	8,338	128.7	109	14,478	20,302	140.2
West Virginia	320	49,704	41,735	84.0	29	15,499	10,690	69.0	349	65,203	52,425	80.4
Wisconsin	511	47,418	58,895	124.2	34	10,882	11,129	102.3	545	58,300	70,024	120.1
Wyoming	58	8,791	5,704	64.9	7	4,917	2,266	46.1	65	13,708	7,970	58.1
Total:												
1960	31,148	3,103,167	3,209,227	103.4	2,584	1,020,222	790,984	77.5	33,732	4,123,389	4,000,211	97.0
1959	30,692	2,912,601	2,945,630	101.1	2,608	975,107	703,377	72.1	33,300	3,887,708	3,649,007	93.9

[1] Includes natural gas mixed with manufactured gas.
[2] Less than 500.

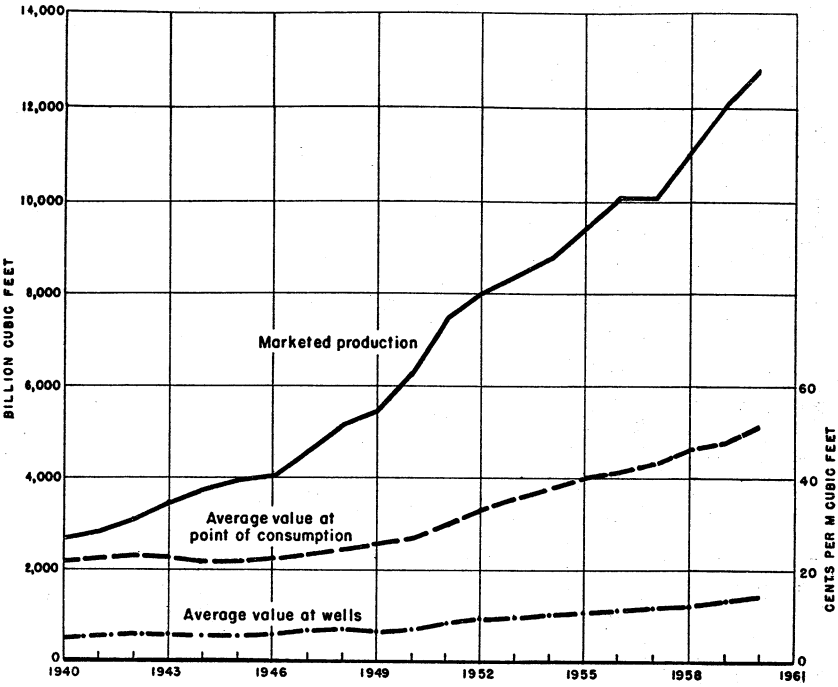

FIGURE 1.—Production and average value of natural gas in the United States, 1940–60.

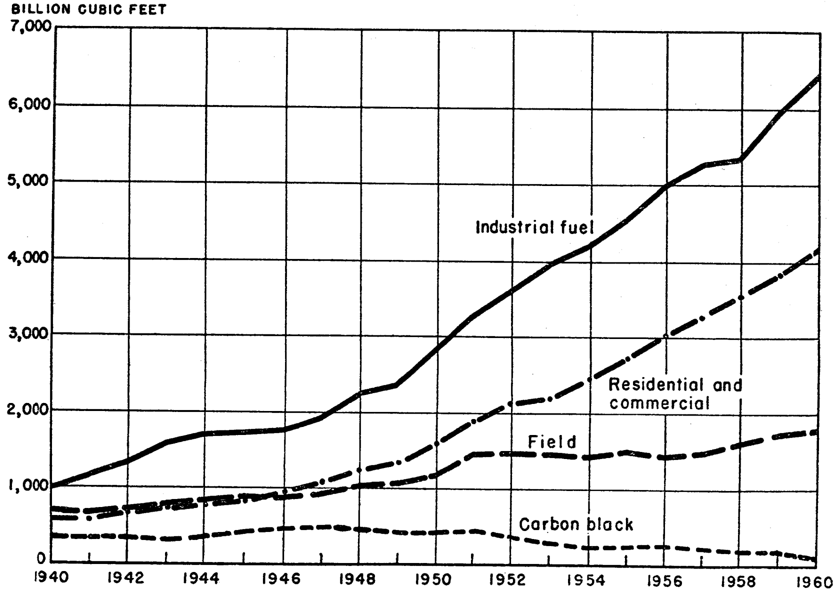

FIGURE 2.—Consumption of natural gas, by uses, in the United States, 1940–60.

INTERSTATE SHIPMENTS, IMPORTS AND EXPORTS

Interstate shipments, including imports and exports, increased from 7,176,157 million cubic feet in 1959 to 7,544,250 million cubic feet, a 5 percent increase. Interstate shipments, excluding imports, amounted to 7,388,604 million cubic feet—58 percent of marketed production.

Imports totaling 155,646 million cubic feet increased 16 percent. Canadian natural gas received in Minnesota, Montana, and Washington totaled 108,657. The balance of 46,989 million cubic feet was received in Texas from Mexico. Exports continued to decline—from 18,413 million cubic feet in 1959 to 11,332 million cubic feet. Canada received 5,759 million cubic feet, and Mexico received the balance, 5, 573 million cubic feet.

PIPELINES

Major extensions to the pipeline network in 1960 included: Completion of the Transwestern Pipeline Company line from Texas to the California border, the Midwestern Gas Transmission Corporation line from the Canadian border in Minnesota to Wisconsin, and the extension of the Trunkline Gas Company line to the Michigan border.

Total cost of the construction authorized by the Federal Power Commission was $787,633,000, compared to $1,202,098,700 in 1959. These authorizations will add 5,784 miles of pipeline (of which 4,437 miles were completed in 1960) that will require an estimated 1,767,251 net tons of steel line pipe, including the installation of compressors aggregating 327,130 horsepower. These projects when completed will add approximately 4 billion cubic feet daily capacity to existing facilities.

CONSUMPTION

Natural gas was consumed in 47 States, and total consumption was 12,509 billion cubic feet, an increase of 6 percent. Consumption by class of consumer and the percent changes from 1959 were as follows: Residential, 3,103 billion cubic feet (+7 percent); commercial, 1,020 billion cubic feet (+5 percent); industrial fuel, 6,409 billion feet (+7 percent); field use, 1,780 billion cubic feet (+2 percent); and carbon black, 198 billion cubic feet (−8 percent). The portland cement industry consumed 171 billion cubic feet, compared to 188 billion in 1959.

TABLE 12.—Industrial consumption of natural gas in the United States

State	Field (pumping, drilling, extraction loss, and other)			Carbon black			Fuel						Total industrial			Fuel used at electric utility plants [1]
	Quantity (million cubic feet)	Value (thousand dollars)	Average value (cents per M c.f.)	Quantity (million cubic feet)	Value at point of consumption: Total (thousand dollars)	Value at point of consumption: Average (cents per M c.f.)	Refinery fuel (million cubic feet)	Natural gas pipeline (million cubic feet)	Other industrial fuel (million cubic feet)	Total fuel (million cubic feet)	Value (thousand dollars)	Average value (cents per M c.f.)	Quantity (million cubic feet)	Value at point of consumption: Total (thousand dollars)	Value at point of consumption: Average (cents per M c.f.)	
Alabama	34	4	11.8	-----	-----	-----	(3)	7,600	[3] 118,162	125,762	39,863	31.7	125,796	39,867	31.7	9,378
Alaska	57	7	12.3	-----	-----	-----	-----	2	-----	2	-----	-----	59	7	11.9	-----
Arizona	-----	-----	-----	-----	-----	-----	-----	15,910	66,890	82,800	25,132	30.4	82,800	25,132	30.4	53,246
Arkansas	12,959	1,116	8.6	-----	-----	-----	12,166	9,147	131,823	153,136	57,626	37.6	166,095	58,742	35.4	46,779
California	[2] 164,426	[2] 42,713	[2] 26.0	(2)	(2)	(2)	75,189	10,583	587,389	673,161	265,137	39.4	837,587	307,850	36.8	322,992
Colorado	22,170	2,934	13.2	-----	-----	-----	2,764	1,238	100,681	104,683	24,404	23.3	126,853	27,338	21.6	37,015
Connecticut	-----	-----	-----	-----	-----	-----	-----	222	9,041	9,263	8,350	90.1	9,263	8,350	90.1	1,756
Delaware	-----	-----	-----	-----	-----	-----	(3)	-----	[3] 4,657	4,657	2,222	47.7	4,657	2,222	47.7	3,190
District of Columbia and Maryland	-----	-----	-----	-----	-----	-----	-----	859	15,964	16,823	13,652	81.2	16,823	13,652	81.2	78
Florida	30	6	20.0	-----	-----	-----	(3)	1,000	[3] 123,486	124,486	40,737	32.7	124,516	40,743	32.7	88,518
Georgia	-----	-----	-----	-----	-----	-----	-----	3,545	101,303	104,848	41,321	39.4	104,848	41,321	39.4	25,337
Idaho	-----	-----	-----	-----	-----	-----	-----	489	16,542	17,031	6,511	38.2	17,031	6,511	38.2	-----
Illinois	19,022	2,148	11.3	-----	-----	-----	12,714	10,068	215,375	238,157	96,230	40.4	257,179	98,378	38.3	42,348
Indiana	524	81	15.5	-----	-----	-----	4,108	5,002	107,172	116,282	45,350	39.0	116,806	45,431	38.9	8,790
Iowa	-----	-----	-----	-----	-----	-----	-----	8,921	91,924	100,845	31,527	31.3	100,845	31,527	31.3	48,587
Kansas	[2] 21,811	[2] 3,151	[2] 14.4	(2)	(2)	(2)	23,928	42,763	169,135	235,826	47,854	20.3	257,637	51,005	19.8	82,195
Kentucky	13,083	2,440	18.7	-----	-----	-----	(3)	18,932	[3] 46,422	65,354	24,053	36.8	78,437	26,493	33.8	2,288
Louisiana	190,565	29,716	15.6	21,786	2,454	11.3	109,592	31,668	515,045	656,305	137,332	20.9	868,656	169,502	19.5	119,818
Massachusetts	-----	-----	-----	-----	-----	-----	-----	274	22,359	22,633	16,485	72.8	22,633	16,485	72.8	10,785
Michigan	1,532	357	23.3	-----	-----	-----	1,695	2,601	117,725	122,021	67,389	55.2	123,553	67,746	57.8	5,209
Minnesota	-----	-----	-----	-----	-----	-----	(3)	304	[3] 97,772	98,076	30,784	31.4	98,076	30,784	31.4	48,521
Mississippi	16,644	3,486	20.9	-----	-----	-----	(3)	31,385	[3] 101,635	133,020	35,597	26.8	149,664	39,083	26.1	34,358
Missouri	431	80	18.6	-----	-----	-----	(3)	7,964	[3] 109,183	117,147	35,478	30.3	117,578	35,558	30.2	30,251
Montana	5,274	420	8.0	-----	-----	-----	3,210	485	16,797	20,492	5,609	27.4	25,766	6,029	23.4	341
Nebraska	5,697	552	9.7	-----	-----	-----	(3)	6,294	[3] 65,603	71,897	20,106	28.0	77,594	20,658	26.6	30,973
Nevada	-----	-----	-----	-----	-----	-----	-----	-----	9,643	9,643	5,882	61.0	9,643	5,882	61.0	6,339
New Hampshire	-----	-----	-----	-----	-----	-----	-----	-----	659	659	515	78.1	659	515	78.1	-----
New Jersey	-----	-----	-----	-----	-----	-----	-----	578	53,232	53,810	27,212	50.6	53,810	27,212	50.6	25,482
New Mexico	116,838	11,858	10.1	48,200	3,884	8.1	1,713	16,972	53,310	71,995	17,251	24.0	237,033	32,993	13.9	33,701
New York	571	257	45.0	-----	-----	-----	-----	2,285	128,995	131,280	87,055	66.3	131,851	87,312	66.2	57,819
North Carolina	-----	-----	-----	-----	-----	-----	-----	2,438	30,740	33,178	16,216	48.9	33,178	16,216	48.9	4,660
North Dakota	9,419	1,789	19.0	-----	-----	-----	(3)	7	[3] 1,179	1,186	453	38.2	10.605	2,242	21.1	103

Ohio	1,138	393	34.5	--------	--------	--------	8,056	9,098	210.523	227,677	121,517	53.4	228,815	121,910	53.3	2,992
Oklahoma	145,214	14,941	10.3	--------	--------	--------	48,511	8,980	91,709	149,200	31,067	20.8	294,414	46,008	15.6	82,820
Oregon	--------	--------	--------	--------	--------	--------	--------	55	20,913	20,968	8,266	39.4	20,968	8,266	39.4	701
Pennsylvania	1,419	684	48.2	--------	--------	--------	22,704	15,109	193,376	231,189	120,685	52.2	232,608	121,369	52.2	5,987
Rhode Island	--------	--------	--------	--------	--------	--------	--------	222	3,212	3,434	2,947	85.8	3,434	2,947	85.8	344
South Carolina	--------	--------	--------	--------	--------	--------	--------	1,221	45,803	47,024	19,222	40.9	47,024	19,222	40.9	23,278
South Dakota	--------	--------	--------	--------	--------	--------	--------	46	9,608	9,654	2,812	29.1	9,654	2,812	29.1	4,454
Tennessee	9,397	1,737	18.5	--------	--------	--------	(3)	5,341	[3] 82,763	88,104	30,269	34.4	97,501	32,006	32.8	7,225
Texas	960,121	86,979	9.1	123,562	12,659	10.3	423,539	52,295	1,190,252	1,666,086	316,884	19.0	2,749,769	416,522	15.1	407,310
Utah	7,774	1,432	18.4	--------	--------	--------	3,715	89	31,337	35,141	10,268	29.2	42,915	11,700	27.3	3,677
Virginia	64	29	45.3	--------	--------	--------	--------	3,935	23,937	27,872	13,049	46.8	27,936	13,078	46.8	1,438
Washington	--------	--------	--------	--------	--------	--------	--------	413	50,043	50,456	20,058	39.8	50,456	20,058	39.8	--------
West Virginia	31,901	3,893	27.9	--------	--------	--------	800	8,440	73,625	82,865	35,774	43.2	114,766	44,667	38.9	941
Wisconsin	--------	--------	--------	--------	--------	--------	(3)	540	[3] 31,780	32,320	19,548	60.5	32,320	19,548	60.5	2,068
Wyoming	25,636	2,655	10.4	--------	--------	--------	9,704	1,755	8,832	20,291	3,975	19.6	45,927	6,630	14.4	671
Total:																
1960	1,779,671	220,002	12.4	197,628	19,853	10.0	775,154	347,075	5,286,510	6,408,739	2,029,674	31.7	8,386,038	2,269,529	27.1	1,724,763
1959	1,737,402	214,987	12.4	214,612	19,732	9.2	752,239	349,348	4,878,329	5,979,916	1,757,986	29.4	7,931,930	1,992,705	25.1	1,627,097

[1] Federal Power Commission. Preliminary. Includes gas other than natural, impossible to segregate and therefore shown separately. Natural gas portion is included in "Other industrial fuel."

[2] 4,080 million cubic feet and 856 thousand dollars in value included in field use to avoid disclosure; included in total "Carbon black."

[3] 11,046 million cubic feet included in "Other industrial fuel" to avoid disclosure; included in total "Refinery fuel."

TABLE 13.—Natural gas processed at natural gasoline and cycling plants in the United States

(Million cubic feet)

States	1956	1957	1958	1959	1960
Arkansas	48,233	43,696	42,538	73,503	120,943
California	572,749	564,675	612,389	527,297	548,406
Colorado	[1] 49,052	[1] 57,759	[1] 61,251	[1] 101,253	84,322
Illinois	[2] 175,618	[2] 192,821	[2] 200,397	[2] 197,246	[3] 194,679
Kansas	407,749	426,454	390,814	432,068	451,676
Kentucky	[3] 406,260	[3] 396,695	[3] 288,907	375,591	[3, 4] 273,558
Louisiana	839,274	865,836	973,299	[3] 1,047,481	1,491,078
Michigan	(2)	(2)	(2)	(2)	(4)
Mississippi	144,227	157,249	171,008	180,583	131,369
Montana	(1)	(1)	(1)	(1)	[5] 41,480
Nebraska [6]	21,211	25,159	35,205	37,680	41,663
New Mexico	578,468	617,726	563,227	652,976	662,479
Ohio	(2)	(2)	(2)	-	-
Oklahoma	620,901	618,715	651,077	708,616	760,743
Pennsylvania	13,949	10,974	5,358	2,932	2,639
Texas	4,318,004	4,354,756	4,233,619	4,508,288	4,578,623
Utah	(1)	(1)	(1)	(1)	(5)
West Virginia	181,772	181,390	156,653	215,979	214,372
Wyoming	67,542	64,656	66,802	125,369	170,159
Total	[7] 8,445,009	8,578,561	8,452,544	9,186,862	9,768,189

[1] Montana and Utah included in Colorado.
[2] Michigan and Ohio included in Illinois.
[3] Includes gas from transmission lines; previously treated in other States.
[4] Michigan included in Kentucky.
[5] Utah included in Montana.
[6] North Dakota included in Nebraska.
[7] Revised.

TABLE 14.—Consumption of natural gas used with manufactured gas in the United States [1]

State	Residential		Commercial		Industrial	Total	
	Number of consumers (thousand)	Quantity (million cubic feet)	Number of consumers (thousand)	Quantity (million cubic feet)	Quantity (million cubic feet)	Quantity (million cubic feet)	Value at point of consumption (thousand dollars)
Connecticut	115	3,409	7	670	989	5,068	5,225
Indiana	154	8,840	8	2,025	15,345	26,210	14,577
Massachusetts	289	10,060	19	2,390	4,960	17,410	35,420
New Jersey	502	11,105	38	1,813	9,745	22,663	31,599
New York	718	68,630	41	15,098	14,868	98,596	167,944
Pennsylvania	751	49,731	35	4,998	24,168	78,897	87,665
Total:							
1960	2,529	151,775	148	26,994	70,075	248,844	342,430
1959	2,958	178,469	216	36,245	123,254	337,968	406,826

[1] Included in tables for consumption of natural gas (tables 10–12).

VALUE AND PRICES

Average value of natural gas at the wellhead was 14.0 cents per thousand cubic feet, 1.1 cents per thousand cubic feet more than 1959, or an estimated total value of $1,789,970,000, compared to $1,556,-800,000 in 1959.

Average value at the point of consumption was 50.1 cents per thousand cubic feet, 2.4 cents per thousand more than 1959, or a total value of $6,269,740,000, compared to $5,641,712,000 in 1959.

TABLE 15.—Average value of natural gas in the United States

(Cents per thousand cubic feet)

State	At wells (estimated)		At point of consumption		State	At wells (estimated)		At point of consumption	
	1959	1960	1959	1960		1959	1960	1959	1960
Alabama	9.7	7.3	48.1	52.3	Nebraska	15.9	17.5	46.2	47.6
Alaska	12.0	12.2	16.0	13.1	Nevada	-------	-------	71.9	72.3
Arizona	-------	-------	41.2	42.5	New Hampshire	-------	-------	157.4	163.3
Arkansas	8.7	11.9	27.3	41.1	New Jersey	-------	-------	140.4	147.6
California	24.6	26.7	52.4	55.6	New Mexico	10.0	10.7	17.1	20.1
Colorado	11.0	11.9	40.2	37.8	New York	30.5	30.9	132.5	127.0
Connecticut	-------	-------	166.4	151.3	North Carolina	-------	-------	82.1	73.8
Delaware	-------	-------	94.6	108.4	North Dakota	9.9	11.4	33.6	39.6
District of Columbia	-------	-------	147.0	148.3	Ohio	23.2	23.5	66.3	70.4
Florida	14.3	16.2	59.6	50.6	Oklahoma	10.0	11.9	25.4	26.1
Georgia	-------	-------	51.3	61.4	Oregon	-------	-------	79.6	74.7
Idaho	-------	-------	48.3	53.6	Pennsylvania	29.2	31.8	78.1	80.3
Illinois	13.9	12.5	71.0	74.9	Rhode Island	-------	-------	164.0	161.8
Indiana	19.0	17.8	68.1	62.6	South Carolina	-------	-------	66.4	58.2
Iowa	-------	-------	52.5	56.2	South Dakota	-------	-------	55.6	60.2
Kansas	12.0	11.7	29.2	30.7	Tennessee	16.7	17.5	48.7	52.2
Kentucky	23.7	24.4	52.0	55.6	Texas	10.8	11.3	18.6	19.4
Louisiana	15.4	17.1	23.3	22.7	Utah	14.2	18.0	45.5	44.7
Maryland	27.0	26.6	130.6	136.4	Virginia	26.2	27.1	101.2	103.4
Massachusetts	-------	-------	160.5	170.0	Washington	-------	-------	56.9	62.2
Michigan	23.0	21.4	82.9	80.0	West Virginia	26.0	26.2	47.7	53.9
Minnesota	-------	-------	59.3	65.8	Wisconsin	-------	-------	98.5	98.8
Mississippi	15.5	18.8	33.3	36.2	Wyoming	8.1	12.0	23.2	24.5
Missouri	-------	25.0	52.7	56.4					
Montana	7.5	7.1	41.6	41.6	Total	12.9	14.0	47.7	50.1

WORLD PRODUCTION

Marketed production of natural gas produced in all known countries has been recorded in million cubic feet by the Bureau of Mines. The data are comparable to Bureau of Mines natural gas statistics as far as possible, that is, marketed production. However, gases used for repressuring and gases flared, vented or otherwise wasted are excluded from the data.

TABLE 16.—Marketed production of natural gas at 60° F. (16.67° C.) and normal atmospheric pressure

(Million cubic feet)

Country [1]	1956	1957	1958	1959	1960
North America:					
Barbados	125	108	98	86	88
Canada	169,153	220,007	337,804	417,335	504,452
Mexico [2]	132,258	173,262	277,576	348,112	360,691
Trinidad	19,319	21,202	23,403	34,850	[3] 28,000
United States	10,081,923	10,680,258	11,030,298	12,046,115	12,771,038
South America:					
Argentina	26,214	29,197	29,693	32,101	[3] 50,650
Bolivia	262	299	224	261	(4)
Brazil [2]	3,130	5,866	11,213	15,994	19,968
Chile	21,913	29,723	49,858	67,746	81,873
Colombia [2]	23,287	23,736	29,557	33,887	82,562
Peru [2]	29,914	37,510	33,762	(4)	(4)
Venezuela	111,749	135,241	146,691	156,434	171,898
Europe:					
Austria	27,801	28,308	30,613	42,098	54,830
Czechoslovakia	10,238	28,805	46,501	(4)	(4)
France	11,659	16,299	21,367	50,804	106,199
Germany, West	13,682	13,328	12,832	14,466	16,717
Hungary [2]	16,869	15,339	13,995	12,353	12,694
Italy	166,644	186,118	193,156	228,307	240,610
Netherlands	6,307	6,195	7,763	9,330	11,830
Poland	16,230	15,592	14,267	15,589	20,500
Rumania	163,235	172,895	189,410	215,797	243,276
U.S.S.R.	450,345	693,524	1,115,495	1,388,304	1,754,040
Yugoslavia	1,437	1,550	1,719	1,866	1,976
Asia:					
Brunei	3,054	2,823	2,757	2,836	(4)
Burma	231	225	325	178	730
India	4,096	4,764	4,725	4,794	5,201
Indonesia [2]	76,319	80,910	77,887	83,224	[3] 87,700
Iran	15,552	25,578	26,288	32,055	36,299
Israel	-----	-----	-----	-----	1,203
Japan [2]	6,598	9,092	13,730	18,913	27,297
Pakistan	10,441	15,349	19,308	22,365	29,842
Taiwan	1,015	1,073	979	983	949
Africa:					
Algeria (Sahara)[2]	-----	-----	4,083	13,786	(4)
Congo, Republic of	-----	-----	-----	231	(4)
Gabon, Republic of	-----	-----	15	258	278
Morocco	273	126	69	154	(4)
Tunisia	217	225	218	225	252
Union of South Africa	6	(4)	(4)	(4)	(4)
Oceania: New Zealand	8	7	5	6	5

[1] Natural gas is produced in China, but no recent information is available.
[2] Total production.
[3] Estimate.
[4] Data not available.

NOTE: Data relate, as far as possible, to natural gas actually collected and utilized as fuel or raw material. They exclude gas used for repressuring and gas flared, vented, or otherwise wasted, whether or not the gas has first been processed for the extraction of natural gasoline.

For countries reporting in the metric system, the following conversion factor will be used:

$$\text{m}^3 \text{ at } 32° \text{ F. } (0° \text{ C.}) \times 37.32 = \text{ft.}^3 \text{ at } 60° \text{ F.}$$
$$(\text{ft.}^3 \text{ at } 60° \text{ F.} \times 0.026795 = \text{m}^3 \text{ at } 32° \text{ F.})$$

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

Natural gas liquids

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GENERAL SUMMARY

NATURAL gas liquids production increased 6 percent in 1960 to 14,287 million gallons. Production of liquefied petroleum (LP) gases and ethane increased 7 percent, and natural gasoline and isopentane production increased 6 percent. About 24 percent less finished gasoline and naphtha was produced at natural gas liquid plants in 1960, but the output of other finished materials increased 20 percent.

Plants shipped 6 percent more natural gas liquids to refineries to be used in blending into motor fuel in 1960, and natural gas liquids accounted for 11 percent of the total refinery output of motor fuel, compared with 10.4 percent in 1959. Sales of liquefied gases and ethane which includes LP-gases produced at plants and liquefied refinery (LR) gases produced at petroleum refineries for uses other than blending into gasoline increased 7 percent to 9,545 million gallons.

SCOPE OF REPORT

Statistics on natural gas liquids are collected by the Bureau of Mines from reports submitted by natural gasoline plants, cycling plants, and fractionators that handle natural gas liquids. Information on production, stocks, and distribution is obtained from monthly reports. Annual reports provide data on type of plant, production, value of production, and volume of gas processed. Reports submitted to the Bureau cover all except the small volume of natural gas liquids recovered at pipeline compressor stations and gas-dehydration plants. Such recovery is considered to be of little significance in the National

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and State totals. Plant condensate is included in the category of natural gas liquids. Field condensate, however, is reported with crude oil and is excluded from the total for natural gas liquids. LR-gases and ethane produced at petroleum refineries are not natural gas liquids, but to obtain complete distribution of liquefied gases the sales data shown in this chapter cover the products of natural gasoline plants and petroleum refineries.

Data on sales of LP-gases are collected by the Bureau of Mines from annual reports received from all producers and distributors and from most of the dealers that sell over 100,000 gallons of LP-gases annually. The reported sample of dealer sales is expanded by Petroleum Administration for Defense (P.A.D.) districts on the basis of domestic demand in the districts. Data on sales of LP-gases used as fuels or chemicals include data on ethane and liquefied gas produced at natural gasoline plants and at petroleum refineries; they exclude, however, data on LP-gases blended into motor fuel.

Liquefied gases and ethane, whether obtained from natural gas or processing in refineries, are defined as follows:

Ethane.—Includes all ethane, ethylene, and mixtures containing more than 50 percent of either.

Propane.—Includes all product covered by NGAA specifications for commercial propane.

TABLE 1.—Salient statistics of the natural gas liquids industry in the United States

[Thousand gallons unless otherwise stated]

	1956	1957	1958	1959	1960
Production:					
Natural gasoline and isopentane	4,438,890	4,499,495	4,355,025	4,222,266	4,479,454
LP-gases and ethane	6,487,413	6,655,282	6,783,000	7,874,706	8,444,074
Finished gasoline and naphtha	832,915	779,807	701,456	660,666	503,659
Other finished products	535,295	455,005	539,977	714,170	859,394
Total	12,294,513	12,389,589	12,379,458	13,471,808	14,286,581
Shipments for use in gasoline [1]	6,990,389	7,241,831	6,904,179	7,067,963	7,522,372
Transfers to nongasoline uses:					
LP-gases [1] and ethane [2]	4,796,743	4,915,211	5,174,140	6,149,430	6,391,217
Other finished products	207,768	181,011	191,077	158,708	212,483
Stocks at plants, terminals, and refineries:					
Natural gasoline	194,757	168,244	198,284	170,058	197,895
LP-gases	587,094	568,601	664,705	790,579	946,758
Other finished products	81,627	109,727	92,595	84,606	70,465
Total	863,478	846,572	955,584	1,045,243	1,215,118
Value of natural gas liquids at plants thousand dollars	697,143	679,456	689,710	758,496	808,385
Average value per gallon cents	5.7	5.5	5.6	5.6	5.7
Natural gas processed million cubic feet	8,590,163	8,578,561	8,452,544	9,186,862	9,768,189
Average yield, all natural gas liquids gallons per M cubic feet	1.43	1.44	1.46	1.47	1.46
Sales for fuel and chemical uses:					
Liquefied petroleum gas and ethane	4,528,356	4,780,141	5,054,271	6,047,061	6,332,699
Liquefied refinery gas and ethane	2,107,407	2,158,980	2,407,818	2,872,100	3,211,950
Total	6,635,763	6,939,121	7,462,089	8,919,161	9,544,649
Exports of natural gasoline, LP-gases, and LR-gases	187,882	192,505	120,017	94,620	125,590
Imports of LP-gases and LR-gases	(3)	(3)	(3)	(3)	68,502

[1] Includes exports of natural gasoline

[2] Includes exports of LP-gases.

[3] Imports of liquefied gases included with gasoline.

Butane-propane mixture.—Includes all product covered by NGAA specifications for commercial butane-propane mixtures.

Butanes.—Includes all product covered by NGAA specifications for commercial butane, except those that contain 60 percent or more isobutane.

Isobutane.—Includes all product covered by NGAA specifications for commercial butane that contain 60 percent or more isobutane.

Other mixtures of liquefied petroleum gases.—Includes mixtures that cannot be classified within the above 5 classifications, such as mixtures containing less than 50 percent ethane but more than 50 percent propane and butane.

RESERVES

The estimated proved recoverable reserves of natural gas liquids in the United States as of December 31, 1960, were 6,816 million barrels, according to the American Gas Association Reserves Committee. This represented a 294 million barrel increase for the year. Reserves increased in 9 States and declined in 14 others. Texas, with a gain of 165 million barrels, and Louisiana, with 75 million, accounted for most of the increase of proved reserves for the year. Proved reserves of natural gas liquids can increase both by the discovery of new fields and by the construction of a gasoline plant in an existing field, which assures improved recovery from that field.

TABLE 2.—Estimated proved recoverable reserves of natural gas liquids[1] in the United States

[Thousand barrels]

State	Reserves as of Dec. 31, 1959	Changes in reserves during 1960			Reserves as of Dec. 31, 1960			
		Extensions and revisions	Discoveries of new fields and new pools in old fields	Net production	Nonassociated with oil	Associated with oil	Dissolved in oil	Total
Arkansas	32,017	−2,640	15	1,895	4,050	14,243	9,204	27,497
California[2]	325,318	16,607	365	28,429	0	102,288	211,573	313,861
Colorado	24,914	2,699	360	3,949	5,881	5,922	12,221	24,024
Illinois	10,754	850	27	1,578	46	0	10,007	10,053
Indiana	124	5	1	20	5	6	99	110
Kansas	196,912	7,680	930	7,119	179,479	15,796	3,128	198,403
Kentucky	49,290	2,000	1,000	3,238	49,052	0	0	49,052
Louisiana[2]	1,357,798	113,002	44,466	82,291	1,173,896	219,740	39,339	1,432,975
Michigan	1,562	118	156	217	580	359	680	1,619
Mississippi	40,944	−4,598	2,340	2,505	22,485	7,591	6,105	36,181
Montana	13,511	−2,297	1,101	627	2,482	0	9,206	11,688
Nebraska	5,432	1,450	25	752	3,600	651	1,904	6,155
New Mexico	423,040	86,134	3,972	28,347	324,387	46,137	114,275	484,799
North Dakota	97,928	−5,066	0	1,644	0	16,388	74,830	91,218
Ohio	1,304	−1,304	0	0	0	0	0	0
Oklahoma	367,569	−5,374	4,601	28,483	155,572	51,790	130,951	338,313
Pennsylvania	3,677	−1,500	0	67	2,110	0	0	2,110
Texas[2]	3,430,375	335,403	58,537	228,141	1,657,955	663,665	1,274,554	3,596,174
Utah	32,376	20,370	0	2,044	13,131	0	37,571	50,702
West Virginia	34,166	10,828	3,610	3,870	44,734	0	0	44,734
Wyoming	73,279	29,252	3	6,159	47,541	1,940	46,894	96,375
Miscellaneous[3]	18	2	0	4	0	0	16	16
Total	6,522,368	603,621	121,509	431,379	3,686,986	1,146,516	1,982,557	6,816,059

[1] Comprises natural gasoline, LP-gases, and condensate.
[2] Includes offshore reserves.
[3] Includes Alabama and Florida.

Source: Committee on natural gas reserves, American Gas Association.

PRODUCTION

The total production of natural gas liquids in 1960 was 14,287 million gallons, a 6 percent increase for the year. LP-gases and ethane represented 59 percent of the total production, natural gasoline and isopentane 31 percent, finished gasoline and naphtha 4 percent, and the remaining 6 percent were the other products that included raw condensate, kerosine, distillate fuel oil, jet fuel, and miscellaneous finished products.

Natural-gasoline and isopentane production increased 6 percent for the year. Ethane production was 24 percent higher (612 million gallons in 1960, compared with 494 million in 1959). The production of LP-gases in 1960 increased 6 percent, and a breakdown of the various gases included in this group shows that propane production increased 12 percent, isobutane 5 percent, and butane 3 percent, while the output of butane-propane mix and other LP-gases mixtures declined 8 percent.

Production of finished gasoline and naphtha was 24 percent less in 1960, but the output of other finished products increased 33 percent. Plant condensate production in 1960 was 17 percent higher than in 1959.

Liquefied gases and ethane produced at petroleum refineries (LR-gases) totaled 3,258 million gallons in 1960, compared with 2,885 million in 1959.

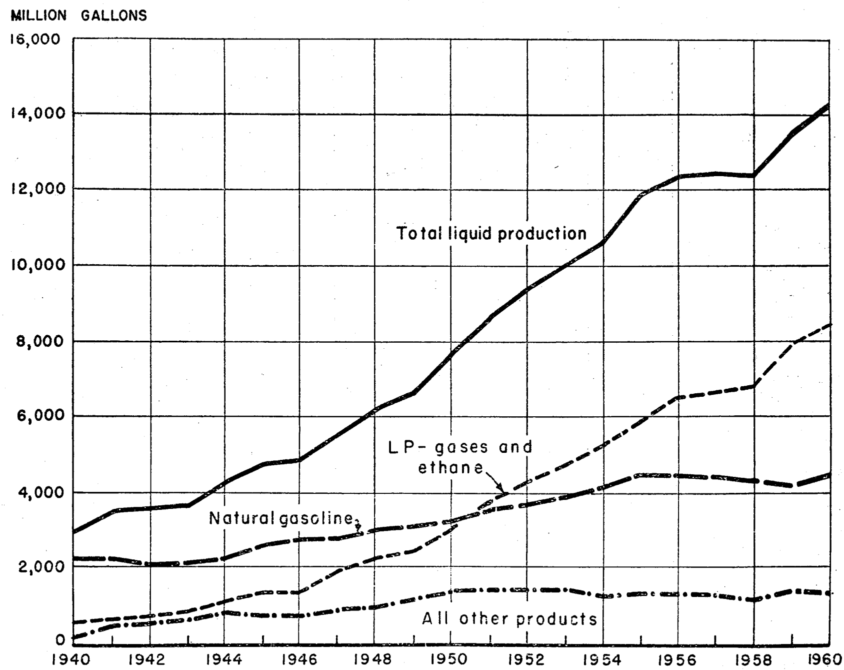

FIGURE 1.—Production of natural gas liquids in the United States, 1940–60.

NATURAL GAS PROCESSED, YIELD, AND NUMBER OF PLANTS

There were 560 natural gas liquid plants operating as of December 31, 1960, compared with 555 a year ago. The number of operators of these plants declined from 198 in 1959 to 185 in 1960. Most of the additional plants in operation at the end of 1960 were the absorption type that produced 81 percent of the natural gas liquids output in 1960.

TABLE 3.—Natural gas liquids produced, value at plants, and gas processed in the United States in 1960, by States

State	Number of operators [2]	Natural gasoline [1]			LP-gases and ethane			Finished gasoline and naphtha		
		Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon
Arkansas	7	32,513	1,980	6.1	73,252	3,735	5.1	1,104	119	10.8
California	22	745,582	58,460	7.8	408,378	21,482	5.3			
Colorado	9	72,951	4,123	5.7	104,275	4,938	4.7			
Illinois	3	16,496	1,313	8.0	358,366	19,941	5.6			
Kansas	10	115,508	6,669	5.8	127,270	6,343	5.0			
Kentucky [3]	8	26,601	1,939	7.3	240,745	12,057	5.2			
Louisiana	36	335,715	24,277	7.2	606,023	28,147	4.6	208,450	17,178	8.2
Mississippi	4	21,684	1,395	6.4	10,151	564	5.6			
Montana [4]	4	24,513	1,381	5.6	90,489	6,133	6.9			
Nebraska [5]	4	26,047	1,742	6.7	89,462	4,607	5.1			
New Mexico	13	305,179	19,413	6.4	645,116	28,788	4.5			
Oklahoma	36	486,924	29,965	6.2	762,258	32,409	4.3	1,639	120	7.3
Pennsylvania	4	1,399	85	6.1	1,580	138	8.7			
Texas	91	2,176,092	154,488	7.1	4,476,142	200,478	4.5	292,466	25,983	8.9
West Virginia	8	23,081	1,505	6.5	329,874	16,527	5.0			
Wyoming	7	69,169	4,323	6.2	120,693	5,279	4.4			
Total	172	4,479,454	313,058	7.0	8,444,074	391,566	4.6	503,659	43,400	8.6

State	Other products [6]			Total natural gas liquids			Natural gas processed	
	Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon	Million cubic feet	Average yield (gallons per M cubic feet)
Arkansas	941	49	5.2	107,810	5,883	5.5	120,943	.89
California	49,075	4,036	8.2	1,203,035	83,978	7.0	548,406	2.19
Colorado	228	15	6.6	177,454	9,076	5.1	84,322	2.10
Illinois				374,862	21,254	5.7	[7] 194,679	1.93
Kansas	360	25	6.9	243,138	13,037	5.4	451,676	.54
Kentucky [3]				267,346	13,996	5.2	[7] 273,558	.98
Louisiana	331,402	24,759	7.5	1,481,590	94,361	6.4	1,491,078	.99
Mississippi	1,964	157	8.0	33,799	2,116	6.3	131,369	.26
Montana [4]				115,002	7,514	6.5	41,480	2.77
Nebraska [5]				115,509	6,349	5.5	41,663	2.77
New Mexico	16,488	999	6.1	966,783	49,200	5.1	662,479	1.46
Oklahoma	43,432	2,989	6.9	1,294,253	65,483	5.1	760,743	1.70
Pennsylvania				2,979	223	7.5	2,639	1.13
Texas	412,348	27,112	6.6	7,357,048	408,061	5.5	4,578,623	1.61
West Virginia	130	8	6.2	353,085	18,040	5.1	214,372	1.65
Wyoming	3,026	212	7.0	192,888	9,814	5.1	170,159	1.13
Total	859,394	60,361	7.0	14,286,581	808,385	5.7	9,768,189	1.46

[1] Includes isopentane.
[2] A producer operating in more than 1 State is counted but once in arriving at total for United States.
[3] Michigan (3 operators) included in Kentucky.
[4] Utah (2 operators) included in Montana.
[5] North Dakota (1 operator) included in Nebraska.
[6] Includes condensate, kerosene, jet fuel, distillate, etc.
[7] Includes gas from transmission lines, previously treated in another State.

TABLE 4.—Monthly production of natural gas liquids in the United States in 1960, by States and districts [1]

[Thousand gallons]

States	January	February	March	April	May	June	July	August	September	October	November	December	Total
West Pennsylvania	320	298	323	265	214	156	186	217	202	227	256	315	2,979
West Virginia	29,769	29,537	29,345	29,332	25,665	29,062	29,099	29,557	28,999	30,942	30,602	31,176	353,085
Illinois	31,552	29,681	31,811	27,921	30,898	27,363	33,077	37,322	26,913	31,860	32,273	34,191	374,862
Kentucky and Michigan	21,577	19,578	19,780	21,389	20,375	22,550	22,075	23,415	23,652	24,780	22,883	25,292	267,346
Kansas	24,356	24,311	23,426	19,325	17,892	15,819	15,011	16,052	16,518	20,630	23,659	26,139	243,138
Nebraska and North Dakota	10,779	10,220	9,300	8,360	8,990	8,277	8,294	8,191	8,223	9,954	10,996	13,925	115,509
Oklahoma	117,944	109,187	113,010	109,343	106,153	90,149	100,108	102,353	98,863	109,798	116,794	120,551	1,294,253
Texas:													
Gulf	149,494	139,077	144,006	133,282	132,578	124,647	131,622	135,000	158,907	164,251	169,620	184,266	1,766,750
East Texas	19,299	18,817	19,536	19,447	18,805	19,182	19,610	19,633	19,076	18,710	17,744	18,436	228,295
Panhandle	98,297	92,393	106,447	102,366	92,003	82,688	86,381	91,679	85,108	92,428	97,720	106,521	1,134,031
West Texas	204,510	191,452	215,287	193,000	194,185	194,817	212,164	212,860	198,538	226,004	203,121	215,936	2,461,874
Rest of State	155,108	147,166	153,373	147,164	145,205	134,802	136,203	138,089	142,449	149,031	152,744	164,764	1,766,098
Total, Texas	626,708	588,905	638,649	595,259	582,776	556,136	585,980	597,261	604,078	650,424	640,949	689,923	7,357,048
Arkansas	9,444	8,936	9,373	9,101	9,617	9,004	9,143	9,210	7,769	8,846	8,620	8.747	107,810
Louisiana:													
Gulf	68,954	72,158	79,827	72,982	75,435	75,099	78,565	81,183	79,285	80,431	75,637	86,122	925,678
Inland	50,136	48,397	49,997	45,389	43,598	41,802	41,842	42,450	41,558	49,240	48,734	52,769	555,912
Total, Louisiana	119,090	120,555	129,824	118,371	119,033	116,901	120,407	123,633	120,843	129,671	124,371	138,891	1,481,590
Mississippi	3,037	2,899	2,990	2,900	2,639	2,405	2,608	2,283	2,633	3,050	3,200	3,155	33,799
New Mexico	79,455	74,028	82,598	76,073	80,073	76,572	79,351	84,135	79,468	87,851	84,164	83,015	966,783
Colorado	15,248	13,488	15,492	14,461	14,918	13,945	14,049	14,732	14,556	13,306	16,402	16,857	177,454
Montana and Utah	9,445	8,484	9,689	9,050	10,087	10,661	10,491	10,619	10,309	7,336	9,312	9,519	115,002
Wyoming	17,406	15,716	16,842	13,613	13,889	13,809	14,663	16,481	16,245	18,240	17,598	18,386	192,888
California	109,924	100,376	103,785	106,703	100,966	94,631	97,422	97,499	91,136	100,123	97,493	102,977	1,203,035
Total, United States	1,226,054	1,156,199	1,236,237	1,161,466	1,144,185	1,087,440	1,141,964	1,172,960	1,150,407	1,247,038	1,239,572	1,323,059	14,286,581

[1] West Pennsylvania separated from eastern part of State to allow grouping either in a Bureau of Mines refinery district or Petroleum Administration for War district. Districts shown for Texas and Louisiana are Bureau of Mines production districts.

The natural gas liquids plants processed 9,768 billion cubic feet of natural gas in 1960, 6 percent more than in 1959, but the average yield per thousand cubic feet of gas processed declined from 1.47 gallons in 1959 to 1.46 gallons in 1960.

TABLE 5.—Natural gas liquids produced in the United States in 1960, by States and methods of manufacture

States	Number of plants operating Dec. 31, 1960				Production (thousand gallons)			
	Compression [1]	Absorption [2]	Cycling [3]	Total	Compression	Absorption	Cycling	Total
Arkansas		6	1	7	(4)	(4)	(4)	107,810
California	4	62	3	69	1,617	1,033,424	167,994	1,203,035
Colorado [5]	4	13	1	18	(4)	(4)	(4)	292,456
Illinois [6]	2	5		7	(4)	(4)		384,349
Kansas	1	12		13	(4)	(4)		243,138
Kentucky	2	4		6	(4)	(4)		257,859
Louisiana	6	36	13	55	57,369	[7] 774,811	649,410	1,481,590
Mississippi	1	3	1	5	(4)	(4)	(4)	33,799
Nebraska [8]		6		6		115,509		115,509
New Mexico	5	21		26	41,383	925,400		966,783
Oklahoma	2	58	2	62	25,417	1,171,511	97,325	1,294,253
Pennsylvania	3	3		6	178	2,801		2,979
Texas	16	193	27	236	227,254	[7] 5,984,453	1,145,341	7,357,048
West Virginia	27	7		34	187,548	165,537		353,085
Wyoming		10		10	(4)	(4)		192,888
Total: 1960	73	439	48	560	561,569	11,622,670	2,102,342	14,286,581
1959	74	434	47	555	571,515	10,858,890	2,041,403	13,471,808

[1] Includes 30 plants manufacturing LP-gases; 1 refrigeration-type plant each in Kansas, Mississippi, and West Virginia; 2 refrigeration-type plants in California, Colorado, and Louisiana; 4 refrigeration-type plants in New Mexico; and 8 refrigeration-type plants in Texas.
[2] Includes combination of absorption with compression process. Includes 315 plants manufacturing LP-gases.
[3] Includes 46 plants manufacturing LP-gases.
[4] Included in State total production and U.S. total production to avoid disclosing individual company operations.
[5] Montana (2 absorption plants) and Utah (1 absorption plant) included in Colorado.
[6] Michigan (2 compression and 1 absorption plants) included in Illinois.
[7] Includes some drip gasoline.
[8] North Dakota (1 absorption plant) included in Nebraska.

SHIPMENTS OF NATURAL GAS LIQUIDS FROM PLANTS AND TERMINALS

The total volume of shipments of natural gas liquids from plants and terminals in 1960 was 14,126 million gallons. This was 5 percent higher than in 1959.

Motor fuel use.—Shipments of natural gas liquids for use as blending material in motor fuel totaled 7,522 million gallons in 1960, 6 percent more than in 1959. Of this total, 93 percent was blended into gasoline at petroleum refineries. Natural gas liquids comprised 11 percent of the total refinery output of gasoline in 1960.

Other uses.—Shipments of natural gas liquids for uses other than motor fuel increased 5 percent in 1960. All shipments of ethane were for chemical use. Shipments of finished products (kerosine, distillate fuel oil, jet fuel, and miscellaneous) increased 34 percent during the year. Details of the uses of liquefied gases are shown in this chapter in the section entitled "Sales of Liquefied Petroleum Gases and Ethane."

TABLE 6.—Supply and distribution at plants and terminals[1] of natural gas liquids in the United States in 1960, by months

[Thousand gallons]

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Production:													
Natural gasoline	329,114	311,582	341,703	353,961	346,968	346,837	362,024	368,528	347,061	360,624	342,098	339,060	4,149,560
Ethane	43,896	49,380	43,388	43,925	47,172	53,720	53,830	53,775	52,404	57,225	55,233	58,193	612,141
LP-gases:													
Propane	386,575	356,193	383,803	327,943	321,221	281,965	310,439	325,565	314,861	350,455	368,225	416,686	4,143,931
Butane, normal	186,739	171,334	181,687	167,863	164,242	155,707	159,017	157,193	168,547	188,878	188,166	197,839	2,087,212
Isobutane	61,321	58,198	62,004	57,102	56,310	51,756	54,909	55,048	53,150	63,105	61,519	63,354	697,776
Butane-propane mixture	54,410	53,012	59,973	57,871	54,379	55,137	54,059	67,011	46,817	49,013	49,215	53,414	654,311
Other LP-gas mixtures	19,785	18,651	20,056	18,118	19,715	19,215	20,657	20,501	22,658	22,211	22,444	24,692	248,703
Isopentane	26,959	26,419	30,603	28,990	28,482	26,867	28,453	22,780	27,119	28,742	27,568	26,912	329,894
Finished gasoline and naphtha	46,193	43,099	44,630	41,304	41,042	37,756	38,594	38,616	39,707	41,581	44,034	47,103	503,659
Condensate, raw	54,866	54,046	53,976	50,306	51,340	45,819	47,873	50,935	54,999	60,254	54,565	67,096	646,075
Other finished products	16,196	14,285	14,414	14,083	13,314	12,661	12,109	13,008	23,084	24,950	26,505	28,710	213,319
Total	1,226,054	1,156,199	1,236,237	1,161,466	1,144,185	1,087,440	1,141,964	1,172,960	1,150,407	1,247,038	1,239,572	1,323,059	14,286,581
Stock change at plants and terminals	−122,338	−72,179	−76,740	+146,213	+168,695	+124,635	+142,161	+31,847	+92,743	+19,263	−82,326	−211,465	+160,509
Shipments:													
For use in gasoline:													
Natural gasoline	321,372	308,929	336,118	348,037	342,504	341,331	362,261	372,327	351,459	364,865	336,138	347,205	4,132,546
LP-gases:													
Propane	4,620	6,426	3,528	3,906	10,122	3,402	4,914	2,856	2,436	4,032	3,234	4,788	54,264
Butane, normal	100,383	75,398	70,209	54,809	58,080	66,485	69,885	75,413	100,435	123,331	137,699	154,567	1,086,694
Isobutane	57,327	54,172	53,985	53,887	55,194	57,163	55,443	65,539	58,787	61,007	55,543	54,005	682,052
Butane-propane mixture	6,384	2,856	3,234	4,284	1,260	420	420	378	378	1,176	882	1,596	23,268
Other LP-gas mixtures	3,780	3,612	7,224	3,276	3,864	4,410	5,292	4,746	4,788	3,192	4,494	4,704	53,382
Isopentane	28,273	26,576	30,237	26,005	28,567	30,049	26,081	26,176	26,793	28,794	26,005	28,157	331,713
Finished gasoline and naphtha	45,777	40,090	41,388	46,642	42,794	43,608	42,608	37,408	37,600	41,535	43,918	39,033	502,401
Condensate	65,176	53,734	54,537	50,985	50,659	46,731	47,782	51,537	54,173	60,434	52,797	67,507	656,052
For other uses:													
Ethane	44,240	48,109	47,159	43,925	47,172	53,720	53,830	53,775	52,404	57,225	55,233	56,387	613,179
LP-gases: [2]													
Propane	470,916	438,118	501,990	239,327	204,792	183,259	200,150	291,226	218,422	277,239	386,226	565,292	3,976,957
Butane, normal	106,194	82,193	70,241	60,475	50,953	55,421	51,037	66,541	72,119	117,925	126,349	102,205	961,653
Isobutane [3]	1,341	1,267	1,263	1,261	1,291	1,338	1,297	1,504	1,376	1,427	1,300	1,294	15,959
Butane-propane mixture	52,642	54,682	60,506	51,447	50,090	53,810	51,541	66,718	38,091	44,514	49,005	54,371	627,417
Other LP-gas mixtures	20,719	17,016	14,575	15,085	12,511	11,861	14,225	14,237	16,883	17,624	16,579	24,737	196,052
Other finished products	19,248	15,200	16,783	11,902	15,637	9,797	13,037	10,732	21,520	23,455	26,496	28,676	212,483
Total demand for natural gas liquids at plants and terminals	1,348,392	1,228,378	1,312,977	1,015,253	975,490	962,805	999,803	1,141,113	1,057,664	1,227,775	1,321,898	1,534,524	14,126,072

[1] Terminals owned by producers.
[2] Includes LP-gas exports.
[3] Reported on LP-gas sales report for chemical use.

TABLE 7.—Natural-gas liquids utilized at refineries in the United States in 1960, by Bureau of Mines refinery districts and by months

[Thousand gallons]

District	January	February	March	April	May	June	July
East Coast	9,114	7,350	5,292	8,274	2,436	4,662	3,906
Appalachian	126	252	294	378	294	504	756
Indiana, Illinois, Kentucky, etc.	59,472	54,348	54,390	45,612	49,098	38,892	45,444
Minn., Wisc., N. Dak. & S. Dak.	2,646	2,352	1,848	1,974	1,680	3,108	2,814
Oklahoma, Kansas, Missouri, etc.	55,902	49,560	53,088	54,642	53,214	51,828	50,442
Texas:							
Inland	87,486	84,924	100,128	93,660	101,682	96,474	106,680
Gulf Coast	175,854	152,040	154,308	153,048	160,356	162,582	169,974
Total Texas	263,340	236,964	254,436	246,708	262,038	259,056	276,654
Louisiana-Arkansas:							
Louisiana Gulf Coast	62,706	54,894	53,172	50,820	46,368	49,014	57,372
Arkansas, Louisiana Inland	37,464	29,148	32,550	30,996	30,870	28,434	29,232
Total Louisiana-Arkansas	100,170	84,042	85,722	81,816	77,238	77,448	86,604
New Mexico	3,192	3,318	2,772	2,730	3,192	3,696	3,906
Other Rocky Mountain	11,130	10,584	10,416	8,232	9,786	11,424	12,180
West Coast	85,554	84,798	92,316	90,426	90,594	92,274	97,104
Total United States	590,646	533,568	560,574	540,792	549,570	542,892	579,810

District	August	September	October	November	December	Total
East Coast	7,182	6,720	7,854	8,610	6,342	77,742
Appalachian	588					3,192
Indiana, Illinois, Kentucky, etc.	50,064	49,770	51,954	58,128	63,294	620,466
Minn., Wisc., N. Dak. & S. Dak.	2,730	2,520	3,486	3,486	3,570	32,214
Oklahoma, Kansas, Missouri, etc.	57,834	61,698	63,210	68,628	65,394	685,440
Texas:						
Inland	103,572	108,696	109,242	103,362	101,766	1,197,672
Gulf Coast	183,078	173,040	181,944	172,998	198,408	2,037,630
Total Texas	286,650	281,736	291,186	276,360	300,174	3,235,302
Louisiana-Arkansas:						
Louisiana Gulf Coast	64,008	63,756	65,898	69,468	76,818	714,294
Arkansas, Louisiana Inland	22,260	27,720	29,358	29,862	30,618	358,512
Total Louisiana-Arkansas	86,268	91,476	95,256	99,330	107,436	1,072,806
New Mexico	4,494	3,612	3,696	3,570	3,108	41,286
Other Rocky Mountain	11,466	11,004	12,306	13,818	14,238	136,584
West Coast	90,678	87,948	101,052	90,174	97,272	1,100,190
Total United States	597,954	596,484	630,000	622,104	660,828	7,005,222

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TABLE 8.—Percentage of natural gas liquids in refinery gasoline[1] in the United States, by Bureau of Mines refinery districts

Year	East Coast	Appalachian	Indiana, Illinois, Kentucky, etc.	Minnesota, Wisconsin, North Dakota, and South Dakota	Oklahoma, Kansas, Missouri, etc.	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas, Louisiana Inland	Rocky Mountain	West Coast	Total
1956	1.4	0.3	5.8	1.5	10.1	34.2	10.9	9.4	4.7	5.1	15.1	9.7
1957	1.3	(2)	5.6	1.5	9.7	34.3	12.7	17.6	4.6	5.8	14.0	10.6
1958	1.3	(2)	4.8	1.7	9.3	34.8	13.4	8.4	13.1	5.6	13.4	9.7
1959	1.2	(2)	4.4	3.3	10.6	35.6	14.4	11.1	25.3	6.7	12.5	10.4
1960	1.0	(2)	5.4	3.6	11.1	35.6	13.6	13.0	35.7	7.8	13.4	11.0

[1] Refinery gasoline excludes jet fuel.
[2] Less than 0.5 percent.

TABLE 9.—Liquefied petroleum gas and ethane produced at natural gasoline and cycling plants in 1960

[Thousand gallons]

States and areas	Propane	Butane-propane mix	Butane	Isobutane	Other LP-gas	Total
West Pennsylvania	1,142	438	----------	----------	----------	1,580
West Virginia	70,884	----------	31,846	----------	[1] 227,144	329,874
Illinois	175,286	658	8,918	16,317	[1] 157,187	358,366
Kansas	52,692	7,188	50,392	16,998	----------	127,270
Kentucky	[2] 73,187	----------	20,748	15,132	[1] [2] 131,678	[2] 240,745
Michigan	(2)		----------	----------	(2)	(2)
Nebraska	[3] 57,740	----------	[3] 31,722	----------	----------	[3] 89,462
North Dakota	(3)	----------	(3)	----------	----------	(3)
Oklahoma	495,452	61,651	165,150	40,005	----------	762,258
Arkansas	35,877	16,641	9,547	10,671	516	73,252
Louisiana:						
Gulf	211,028	24,114	82,067	52,438	[1] 14,044	383,691
Inland	98,516	79,287	18,500	26,029	----------	222,332
Total Louisiana	309,544	103,401	100,567	78,467	14,044	606,023
Mississippi	7,386	882	1,883	----------	----------	10,151
New Mexico	326,324	20,307	269,486	28,999	----------	645,116
Texas:						
Gulf	245,176	50,203	233,498	149,048	169,315	847,240
West	1,077,588	130,071	507,273	92,710	7,029	1,814,671
East	95,657	7,261	33,873	1,528	----------	138,319
Panhandle	335,630	24,866	293,041	124,792	20,008	798,337
Other	327,612	194,718	161,885	91,961	[1] 101,399	877,575
Total Texas	2,081,663	407,119	1,229,570	460,039	297,751	4,476,142
Colorado	69,181	----------	34,356	----------	738	104,275
Montana	[4] 50,090	2,815	[4] 37,584	----------	----------	[4] 90,489
Utah	(4)	----------	(4)	----------	----------	(4)
Wyoming	76,153	47	44,493	----------	----------	120,693
California	261,330	33,164	50,950	31,148	31,786	408,378
Grand total	4,143,931	654,311	2,087,212	697,776	[5] 860,844	8,444,074

[1] Includes ethane production.
[2] Michigan included with Kentucky.
[3] North Dakota included with Nebraska.
[4] Utah included with Montana.
[5] Includes 612,141,000 gallons of ethane production.

TABLE 10.—Liquefied petroleum gas and ethane produced at refineries in 1960

[Thousand gallons]

States and areas	Propane	Butane-propane mix	Butane	Other LR-gas	Total
East Coast	209,454		34,818	[1] 39,606	283,878
West New York	18,732	504	42		19,278
Pennsylvania	129,570	210	1,092		130,872
West Virginia				1,302	1,302
Illinois	128,436		18,984	2,142	149,562
Indiana	32,718	−966	−420	−42	31,290
Kansas	47,922	1,386	20,496		69,804
Kentucky	[2] 17,556	−504	−210	[2] 84	[2] 16,926
Michigan	30,702		462	[1] 5,796	36,960
Tennessee	(2)				(2)
Minnesota	(3)		(3)	(3)	(3)
Missouri	(3)				(3)
Nebraska	[3] 35,532		[3] 9,660	[3] 84	[3] 45,276
North Dakota	(3)		(3)		(3)
Ohio	108,612	−168	2,772	4,410	115,626
Oklahoma	90,426	13,230	28,728	46,410	178,794
Alabama	(4)	(4)	(4)		(4)
Arkansas	(4)	(4)	(4)	(4)	(4)
Louisiana:					
Gulf	218,442	28,308	48,510	[1] 387,828	683,088
Inland	294	3,024			3,318
Total	218,736	31,332	48,510	[1] 387,828	686,406
Mississippi	[4] 25,452	[4] 2,016	[4] 5,922	[4] 1,428	[4] 34,818
New Mexico	3,402		−1,008		2,394
Texas:					
Gulf	356,370	2,184	237,048	[1] 261,366	856,968
Inland	84,588	5,460	49,560		139,608
Total	440,958	7,644	286,608	[1] 261,366	996,576
Colorado	6,426		4,956		11,382
Montana	9,366		6,048		15,414
Utah	20,790		4,032		24,822
Wyoming	2,814		8,526		11,340
California	265,272	11,886	88,116	[1] 30,282	395,556
Grand total	1,842,876	66,570	568,134	[5] 780,596	3,258,276

[1] Includes ethane production.
[2] Tennessee included with Kentucky.
[3] Minnesota, Missouri, and North Dakota included with Nebraska.
[4] Alabama and Arkansas included with Mississippi.
[5] Includes 359,856,000 gallons of ethane production.

TABLE 11.—Liquefied petroleum gas and ethane produced at refineries in 1959

[Thousand gallons]

States and areas	Propane	Butane-propane mix	Butane	Other LR-gas	Total
East Coast	183,288	462	30,660	[1] 25,494	239,904
West New York	9,828				9,828
Pennsylvania	131,544		5,082	84	136,710
West Virginia				2,394	2,394
Illinois	85,974		6,132	−504	91,602
Indiana	(2)				(2)
Kansas	33,348	13,356	31,752		78,456
Kentucky	[2] [3] 63,042		2,394		[2] [3] 65,436
Michigan	(2)			(2)	(2)
Minnesota			(4)	(4)	(4)
Missouri	(4)		(4)		(4)
Nebraska	[3] [4] 26,544		[4] 8,190	[4] 168	[3] [4] 34,902
North Dakota	(4)				(4)
Ohio	96,936	42	4,662	588	102,228
Oklahoma	83,412	19,488	21,210	29,526	153,636
Tennessee	(2)				(2)
Alabama	(5)	(5)	(5)		(5)
Arkansas	(5)			(5)	(5)
Louisiana:					
Gulf	199,248	24,612	55,188	[1] 346,962	626,010
Inland		3,486		336	3,822
Total	199,248	28,098	55,188	[1] 347,298	629,832
Mississippi	[5] 15,078	[5] 210	[5] 7,014	6,636	[5] 28,938
New Mexico	2,394		−168		2,226
Texas:					
Gulf	336,378	7,308	299,880	[1] 194,894	838,460
Inland	71,736	1,050	47,250	1,092	121,128
Total	408,114	8,358	347,130	[1] 195,986	959,588
Colorado	6,048		6,972		13,020
Montana	7,644		2,100		9,744
Utah	19,530		2,226		21,756
Wyoming	2,562		4,620		7,182
California	192,654	3,024	80,430	[1] 21,756	297,864
Grand total	1,567,188	73,038	615,594	[6] 629,426	2,885,246

[1] Includes ethane production.
[2] Indiana, Michigan, and Tennessee included with Kentucky.
[3] Revised.
[4] Minnesota, Missouri, and North Dakota included with Nebraska.
[5] Alabama and Arkansas included with Mississippi.
[6] Includes 295,344,000 gallons of ethane production.

SALES OF LIQUEFIED PETROLEUM GASES[5] AND ETHANE

Domestic sales of LP-gases, excluding LP-gases used in gasoline, increased 7 percent in 1960, compared with a 20 percent increase in 1959. Changes from 1959 in the various sales categories were as follows:

	Percent change
Domestic and commercial	+7
Internal combustion	+1
Industrial	0
Refinery fuel	+15
Gas manufacture	−14
Chemical manufacture	+20
Synthetic-rubber manufacture	+5
Secondary recovery	−77
All other uses	−10

Sales of LP-gases in Hawaii were included in the United States totals for the first time in 1960.

TABLE 12.—Sales of LP-gases[1] and ethane in the United States, by types

[Thousand gallons]

Year	Ethane	Percent of total	Propane	Percent of total	Butane	Percent of total
1956	(2)		3,626,189	54.6	888,545	13.4
1957	(2)		4,009,144	57.8	1,117,748	16.1
1958	(2)		4,247,373	56.9	1,119,544	15.0
1959	783,789	8.8	5,132,194	57.5	1,298,487	14.6
1960	965,175	10.1	5,743,694	60.2	1,099,544	11.5

Year	Isobutane	Percent of total	Butane-propane mixtures	Percent of total	All other mixtures	Percent of total	Total LP-gas and ethane	Total percent
1956	36,088	0.5	1,160,017	17.5	924,924	14.0	6,635,763	100.0
1957	26,721	.4	934,183	13.5	851,325	12.2	6,939,121	100.0
1958	25,805	.3	1,050,086	14.1	1,019,281	13.7	7,462,089	100.0
1959	11,086	.1	1,143,284	12.8	550,321	6.2	8,919,161	100.0
1960	15,959	.1	1,093,511	11.5	626,766	6.6	9,544,649	100.0

[1] Data include LR-gases but exclude LP-gases blended into gasoline.
[2] Not reported separately before 1959.

TABLE 13.—Sales of LP-gases[1] and ethane in the United States, by uses

[Thousand gallons]

Year	Domestic and commercial	Internal combustion	Industrial	Refinery fuel	Gas manufacturing	Chemical	Synthetic rubber	Used in the secondary recovery of petroleum	All others	Total
1956	3,001,021	773,471	438,916	142,590	212,293	1,600,604	418,101	(2)	48,767	6,635,763
1957	3,067,070	805,056	441,474	122,405	231,155	1,732,338	418,189	68,557	52,877	6,939,121
1958	3,293,677	852,387	492,862	179,231	238,911	1,898,862	371,961	68,981	65,217	7,462,089
1959	3,934,792	889,698	439,200	136,830	182,903	2,525,910	513,941	231,134	64,753	8,919,161
1960	4,224,537	897,915	438,659	157,036	157,041	3,019,011	538,971	53,240	58,239	9,544,649

[1] Data include LR-gases but exclude LP-gases blended into gasoline.
[2] Not reported separately before 1957.

[5] Data include LR-gases. The survey covering sales of LP-gases in the West Coast marketing area (P.A.D. district 5) was made by Frank A. Moore, Division of Mineral Resources, Bureau of Mines, San Francisco, Calif.

TABLE 14.—Sales of LP-gases [1] and ethane in the United States, by P.A.D. districts, States and uses

[Thousand gallons]

District and State	Domestic and commercial		Internal combustion		Industrial		Refinery fuel		Gas manufacturing	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
District 1:										
Connecticut	32,822	30,854	1,013	350	8,679	8,436			1,161	1,465
Delaware	10,031	8,694	186	414	1,908	2,456			98	7
Florida	155,499	170,871	12,733	15,005	8,868	7,475			20,116	12,736
Georgia	99,953	112,596	11,778	12,014	7,376	8,262			16,781	15,717
Maine	16,484	16,912	133	132	792	891			483	99
Maryland and D.C	29,092	30,498	1,005	1,598	3,220	3,980			4,771	6,215
Massachusetts	37,845	37,135	842	718	3,117	3,976			3,965	5,171
New Hampshire	18,243	20,354	15	20	718	947			1,987	1,012
New Jersey	35,642	36,435	2,201	1,115	17,162	18,007	(2)	(2)	2,413	2,482
New York	101,857	105,263	3,096	3,309	10,823	9,990			1,431	985
North Carolina	69,735	79,810	1,894	980	8,819	9,859			6,985	787
Pennsylvania	54,342	55,565	2,649	3,586	19,497	24,433			3,265	1,018
Rhode Island	7,169	7,362	223	256	867	881			453	208
South Carolina	42,903	45,745	2,088	2,445	8,924	6,544			153	944
Vermont	11,939	12,771	30	27	1,056	1,362			2,936	2,786
Virginia	32,870	36,279	1,360	1,316	3,588	3,803			1,705	5,158
West Virginia	9,134	11,173	272	321	1,722	1,039			256	128
Total	765,560	818,317	41,518	43,606	107,136	112,341	26,944	29,358	68,959	56,918
District 2:										
Illinois	238,201	256,538	45,153	57,938	37,241	40,507			13,387	4,904
Indiana	158,674	167,476	6,711	8,649	44,974	43,502			20,284	11,798
Iowa	123,185	163,644	3,584	4,154	6,669	4,939			2,314	1,319
Kansas	167,157	170,313	38,949	39,354	6,359	7,423			----------	----------
Kentucky	58,238	68,980	2,408	6,183	2,679	3,109			----------	----------
Michigan	88,530	95,835	1,538	3,881	8,865	11,852			1,342	995
Minnesota	142,952	153,576	6,651	4,971	23,094	24,663			9,177	5,327
Missouri	209,597	231,574	10,789	7,891	10,941	9,369	(2)	(2)	2,826	289
Nebraska	80,915	88,459	16,310	18,848	1,544	1,343			354	774
North Dakota	33,965	38,887	8,197	5,340	1,869	2,712			2,394	3,956
Ohio	80,182	86,473	4,627	6,608	10,551	11,231			10,900	8,253
Oklahoma	205,351	194,592	60,320	53,143	14,751	7,810			323	----------
South Dakota	49,680	52,732	4,835	3,954	1,036	602			267	50
Tennessee	39,770	42,582	4,421	4,004	3,147	6,615			1,168	1,649
Wisconsin	112,351	132,172	5,457	4,239	42,232	35,888			8,979	5,998
Total	1,788,748	1,943,833	219,950	229,157	215,952	211,565	43,359	68,502	73,715	45,312

District 3:										
Alabama	87,760	103,828	6,332	5,606	2,877	3,055			973	-----
Arkansas	120,024	139,901	51,783	56,629	2,337	5,238			-----	-----
Louisiana	70,190	77,413	31,811	36,121	14,646	15,925	(2)	(2)	1,883	-----
Mississippi	91,270	121,044	31,312	40,363	3,991	2,325			21	-----
New Mexico	66,034	71,194	20,817	22,821	6,255	4,210			4,783	2,888
Texas	481,180	498,197	387,024	371,217	32,341	34,124			1,155	993
Total	916,458	1,011,577	529,079	532,757	62,447	64,877	22,735	17,177	8,815	3,881
District 4:										
Colorado	112,462	103,596	14,743	17,103	3,534	1,373			450	766
Idaho	18,312	15,503	1,236	1,281	2,165	2,321			-----	-----
Montana	26,966	25,015	6,668	5,245	443	669	(2)	(2)	-----	-----
Utah	12,276	12,297	3,042	6,400	233	256			-----	-----
Wyoming	26,055	27,731	16,483	12,824	2,812	2,756			-----	-----
Total	196,071	184,142	42,172	42,853	9,187	7,375	16,714	10,038	450	766
District 5:										
Alaska	1,405	1,767	-----	-----	-----	-----			-----	107
Arizona	16,993	19,624	5,761	6,321	2,928	4,361			95	-----
California	187,827	186,660	47,609	39,158	17,553	20,860			6,197	21,015
Hawaii	(3)	2,835	(3)	330	(3)	117	(2)	(2)	(3)	1,420
Nevada	13,087	13,573	529	875	192	172			15,536	17,859
Oregon	29,263	25,052	2,429	1,783	8,692	13,558			8,391	8,406
Washington	19,380	17,157	651	1,075	15,113	3,433			745	1,357
Total	267,955	266,668	56,979	49,542	44,478	42,501	27,078	31,961	30,964	50,164
Total U.S. sales	3,934,792	4,224,537	889,698	897,915	439,200	438,659	136,830	157,036	182,903	157,041

See footnotes at end of table.

TABLE 14.—Sales of LP-gases[1] and ethane in the United States by P.A.D. districts, States and uses—Continued

[Thousand gallons]

District and State	Chemical		Synthetic rubber		Used in the secondary recovery of petroleum		All other		Total	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
District 1:										
Connecticut	----	----					2,303	2,743	45,978	43,848
Delaware	----	----					30	163	12,253	11,734
Florida	----	----					2,756	1,173	199,972	207,260
Georgia	179	----					2,829	3,664	138,896	152,253
Maine	----	----					57	55	17,949	18,089
Maryland and D.C.	----	----					5	42	38,093	42,333
Massachusetts	----	----					828	858	46,597	47,858
New Hampshire	----	----					----	----	20,963	22,333
New Jersey	61,949	74,058	(4)	(4)	(2)	(2)	34	20	119,401	132,117
New York	284	150					31	112	117,522	119,809
North Carolina	----	----					4,554	6,907	91,987	98,343
Pennsylvania	15,894	14,863					80	91	95,727	99,556
Rhode Island	----	----					----	----	8,712	8,707
South Carolina	----	----					934	1,307	55,002	56,985
Vermont	----	----					----	----	15,961	16,946
Virginia	144	155					561	639	40,228	47,350
West Virginia	302,443	340,346					----	----	313,827	353,007
Total	380,893	429,572	----	----	----	----	15,002	17,774	[5] 1,406,012	[5] 1,507,886
District 2:										
Illinois	156,745	173,887					1,241	1,996	491,968	535,770
Indiana	174	53					321	913	231,138	232,391
Iowa	----	----					2,428	2,696	138,180	176,752
Kansas	----	----					1,250	667	213,715	217,757
Kentucky	64,272	62,330					263	51	127,860	140,653
Michigan	3,357	14,183					1,115	460	104,747	127,206
Minnesota	3,195	1,322					1,415	1,476	186,484	191,335
Missouri	----	----	(4)	(4)	(2)	(2)	269	538	234,422	249,661
Nebraska	----	----					1,023	1,875	100,146	111,299
North Dakota	----	----					39	----	46,464	50,895
Ohio	661	711					409	413	107,330	113,689
Oklahoma	1,653	47,036					1,323	2,972	283,721	305,553
South Dakota	----	----					138	199	55,956	57,537
Tennessee	132	84					186	188	48,824	55,122
Wisconsin	----	----					487	518	169,506	178,815
Total	230,189	299,606	----	----	20,331	153	11,907	14,962	[5] 2,604,151	[5] 2,813,090

District 3:										
Alabama	----	----	----	----			994	142	98,936	112,631
Arkansas	----	----	----	----			1,366	770	175,510	202,538
Louisiana	363,188	422,568	45,591	54,479	(2)	(2)	3,206	4,555	530,515	611,061
Mississippi	----	----	----	----			503	1,620	127,097	165,352
New Mexico	----	----	----	----			534	2,719	98,423	103,832
Texas	1,461,231	1,757,954	441,405	459,181			19,180	9,526	2,823,516	3,131,192
Total	1,824,419	2,180,522	486,996	513,660	191,460	19,335	25,783	19,332	[5] 4,068,192	[5] 4,363,118
District 4:										
Colorado	----	----					1,557	826	132,746	123,664
Idaho	----	----					44	5	21,757	19,110
Montana	----	----	(4)	(4)	(2)	(2)	----	----	34,077	30,929
Utah	177	----					3	7	15,731	18,960
Wyoming	----	----					57	45	45,407	43,356
Total	177	----	----	----	1,307	1,748	1,661	883	[5] 267,739	[5] 247,805
District 5:										
Alaska	----	----	----	----			----	48	1,405	1,922
Arizona	----	----	----	----			----	87	25,777	30,393
California	90,232	109,311	26,945	24,415			10,103	5,062	386,466	406,481
Hawaii	(3)	----	(3)	----	(2)	(2)	(3)	----	(3)	4,702
Nevada	----	----	----	----			----	----	29,344	32,479
Oregon	----	----	----	896			131	91	48,906	49,786
Washington	----	----	----	----			166	----	36,055	23,022
Total	90,232	109,311	26,945	25,311	18,036	32,004	10,400	5,288	[5] 573,067	[5] 612,750
Total U.S. sales	2,525,910	3,019,011	513,941	538,971	231,134	53,240	64,753	58,239	8,919,161	9,544,649

[1] Data include LR-gases.
[2] Individual States not shown to avoid disclosing individual company data.
[3] Not included in United States totals before 1960.
[4] No sales for synthetic-rubber use reported in this district.
[5] Refinery fuel and use for secondary recovery included in district totals only.

Table 15.—Sales of LP-gases [1] and ethane in the United States, by P.A.D. districts and States

[Thousand gallons]

District and State	Total LP-gases and ethane														Percent change
	Ethane		Propane		Butane		Isobutane		Butane-propane mixtures		All other mixtures		Total LP-gases and ethane		
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960	
District 1:															
Connecticut	---	---	45,135	43,577	825	259	---	---	18	12	---	---	45,978	43,848	−4.6
Delaware	---	---	12,182	11,697	1	---	---	---	70	37	---	---	12,253	11,734	−4.2
Florida	---	---	153,211	162,964	3,344	2,363	---	---	43,417	41,933	---	---	199,972	207,260	3.6
Georgia	---	---	98,832	116,090	4,890	4,584	---	---	35,174	31,579	---	---	138,896	152,253	9.6
Maine	---	---	17,949	18,089	---	---	---	---	---	---	---	---	17,949	18,089	0.8
Maryland and D.C.	---	---	37,874	42,315	---	---	---	---	219	18	---	---	38,093	42,333	11.1
Massachusetts	---	---	46,205	47,441	392	123	---	---	---	294	---	---	46,597	47,858	2.7
New Hampshire	---	---	19,666	22,003	1,287	330	---	---	10	---	---	---	20,963	22,333	6.5
New Jersey	27,740	38,697	67,228	69,136	24,024	24,264	---	---	310	20	99	---	119,401	132,117	10.6
New York	---	---	113,385	116,997	12	11	---	---	4,125	2,801	---	---	117,522	119,809	1.9
North Carolina	---	---	89,144	95,576	239	90	---	---	2,604	2,677	---	---	91,987	98,343	6.9
Pennsylvania	---	---	90,494	90,866	1,545	4,914	---	---	3,688	3,776	---	---	95,727	99,556	4.0
Rhode Island	---	---	8,712	8,707	---	---	---	---	---	---	---	---	8,712	8,707	−0.1
South Carolina	---	---	43,031	44,071	89	92	---	---	11,882	12,822	---	---	55,002	56,985	3.6
Vermont	---	---	15,961	16,946	---	---	---	---	---	---	---	---	15,961	16,946	6.2
Virginia	---	---	40,021	46,765	207	418	---	---	---	167	---	---	40,228	47,350	17.7
West Virginia	184,865	304,979	10,228	12,604	17,478	19,453	---	---	2,747	27	98,509	15,944	313,827	353,007	12.5
Total	212,605	343,676	[2] 917,680	[2] 975,548	[2] 70,468	[2] 72,607	---	---	[2] 106,239	[2] 100,111	[2] 99,020	15,944	[2] 1,406,012	[2] 1,507,886	7.2
District 2:															
Illinois	154,846	157,185	326,418	358,791	5,885	17,037	---	---	4,819	2,589	---	168	491,968	535,770	8.9
Indiana	---	---	189,980	199,937	37,975	30,524	---	---	3,183	1,930	---	---	231,138	232,391	0.5
Iowa	---	---	136,396	174,488	1,186	1,277	---	---	598	987	---	---	138,180	176,752	27.9
Kansas	---	---	171,577	179,042	21,701	17,732	---	---	20,437	20,983	---	---	213,715	217,757	1.9
Kentucky	63,987	62,170	60,899	75,540	114	750	---	---	2,860	2,183	---	10	127,860	140,653	10.0
Michigan	---	6,322	100,600	118,433	332	195	---	---	1,941	---	1,874	2,256	104,747	127,206	21.4
Minnesota	---	---	174,712	179,981	11,747	11,244	---	---	25	110	---	---	186,484	191,335	2.6
Missouri	---	---	216,843	238,521	4,547	3,500	---	---	13,032	7,640	---	---	234,422	249,661	6.5
Nebraska	---	---	95,220	107,146	2,595	1,991	---	---	2,331	2,162	---	---	100,146	111,299	11.1
North Dakota	---	---	41,338	46,350	3,160	3,625	---	---	1,966	920	---	---	46,464	50,895	9.5
Ohio	---	---	106,810	113,410	343	143	---	---	177	136	---	---	107,330	113,689	5.9
Oklahoma	---	---	186,276	188,624	30,360	26,234	196	---	66,889	45,984	---	44,711	283,721	305,553	7.7
South Dakota	---	---	54,335	56,634	468	611	---	---	1,153	292	---	---	55,956	57,537	2.8
Tennessee	---	---	42,228	49,814	1,757	1,320	---	---	4,839	3,988	---	---	48,824	55,122	12.9
Wisconsin	---	---	145,138	161,937	22,082	13,655	---	---	2,286	3,223	---	---	169,506	178,815	5.5
Total	218,833	225,677	[3] 2,072,650	[3] 2,268,862	[3] 175,203	[3] 169,647	196	---	[3] 135,395	[3] 101,759	1,874	47,145	[3] 2,604,151	[3] 2,813,090	8.0

District 3:															
Alabama	--------	--------	61,395	78,781	5,214	3,027	--------	--------	32,327	30,823	--------	--------	98,936	112,631	13.8
Arkansas	--------	--------	94,014	120,878	12,855	9,816	--------	--------	68,641	71,844	--------	--------	175,510	202,538	15.4
Louisiana	196,416	217,073	62,241	71,708	58,954	77,101	--------	--------	70,381	73,533	142,523	171,646	530,515	611,061	15.2
Mississippi	--------	--------	57,067	83,393	11,737	10,956	--------	--------	58,293	71,003	--------	--------	127,097	165,352	30.1
New Mexico	--------	--------	74,411	90,641	2,209	1,418	--------	--------	21,803	11,773	--------	--------	98,423	103,832	5.5
Texas	155,935	178,749	1,104,029	1,342,020	741,721	705,995	10,890	15,959	543,491	555,969	267,450	332,500	2,823,516	3,131,192	10.9
Total	352,351	395,822	[3] 1.504,648	[3] 1,823,848	[3] 995,394	[3] 808,398	10,890	15,959	[3] 794,936	[3] 814,945	409,973	504,146	[3] 4,068,192	[3] 4,363,118	7.2
District 4:															
Colorado	--------	--------	122,343	117,595	1,974	1,355	--------	--------	8,429	4,714	--------	--------	132,746	123,664	−6.9
Idaho	--------	--------	21,757	19,110	--------	--------	--------	--------	--------	--------	--------	--------	21,757	19,110	−12.2
Montana	--------	--------	29,803	27,922	1,681	1,719	--------	--------	2,593	1,288	--------	--------	34,077	30,929	−9.2
Utah	--------	--------	13,744	16,739	977	149	--------	--------	1,010	2,072	--------	--------	15,731	18,960	20.5
Wyoming	--------	--------	32,370	34,095	1,470	742	--------	--------	11,567	8,519	--------	--------	45,407	43,356	−4.5
Total	--------	--------	[3] 225,520	[3] 218,713	[3] 18,620	[3] 12,499	--------	--------	23,599	16,593	--------	--------	[3] 267,739	[3] 247,805	−7.5
District 5:															
Alaska	--------	--------	1,405	1,922	--------	--------	--------	--------	--------	--------	--------	--------	1,405	1,922	36.8
Arizona	--------	--------	21,268	24,939	95	--------	--------	--------	4,414	5,454	--------	--------	25,777	30,393	17.9
California	--------	--------	237,848	271,316	37,752	27,869	--------	--------	71,412	47,765	39,454	59,531	386,466	406,481	5.2
Hawaii	(4)	--------	(4)	43	(4)	--------	(4)	--------	(4)	4,659	(4)	--------	(4)	4,702	--------
Nevada	--------	--------	29,326	32,466	--------	--------	--------	--------	18	13	--------	--------	29,344	32,479	10.7
Oregon	--------	--------	45,624	49,000	--------	--------	--------	--------	3,282	786	--------	--------	48,906	49,786	1.8
Washington	--------	--------	32,066	21,596	--------	--------	--------	--------	3,989	1,426	--------	--------	36,055	23,022	−36.2
Total	--------	--------	[3] 411,696	[3] 456,723	[3] 38,802	[3] 36,393	--------	--------	83,115	60,103	39,454	59,531	[3] 573,067	[3] 612,750	6.9
Total U.S. sales	783,789	965,175	5,132,194	5,743,694	1,298,487	1,099,544	11,086	15,959	1,143,284	1,093,511	550,321	626,766	8,919,161	9,544,649	7.0

[1] Data include LR-gases but exclude LP-gases blended into gasoline.
[2] Consumption as refinery fuel shown in district totals only.
[3] Refinery fuel and use for secondary recovery included in district totals only.
[4] Not included in U.S. totals before 1960.

STOCKS

Total stocks of natural gas liquids were 1,215 million gallons on December 31, 1960, an increase of 170 million gallons for the year. Stocks of LP-gases in underground storage at the end of the year totaled 709 million gallons, compared with 639 million on December 31, 1959. Stocks of LR gases at the end of 1960 totaled 153 million gallons and included 99 million in underground storage.

TABLE 16.—Stocks of natural gas liquids in the United States

[Thousand gallons]

Date	Natural gasoline and isopentane		LP-gases and ethane		Other finished products and plant condensate		Total		
	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries	Grand total
Dec. 31:									
1956	136,335	58,422	560,928	26,166	72,345	9,282	769,608	93,870	863,478
1957	121,414	46,830	605,249	22,596	94,481	15,246	821,144	84,672	905,816
1957 [1]	121,414	46,830	546,005	22,596	94,481	15,246	761,900	84,672	846,572
1958	156,788	41,496	634,885	29,820	80,289	12,306	871,962	83,622	955,584
1959	128,100	41,958	767,143	23,436	72,426	12,180	967,669	77,574	1,045,243
1960									
Jan. 31	134,528	52,416	651,323	26,754	59,480	16,548	845,331	95,718	941,049
Feb. 29	137,024	57,456	574,242	25,158	61,886	17,556	773,152	100,170	873,322
Mar. 31	142,975	60,858	491,239	21,672	62,198	15,540	696,412	98,070	794,482
Apr. 30	151,884	59,136	632,379	19,740	58,362	11,508	842,625	90,384	933,009
May 31	156,263	60,900	800,089	21,798	54,968	14,784	1,011,320	97,482	1,108,802
June 30	158,587	68,712	926,300	22,008	51,068	7,266	1,135,955	97,986	1,233,941
July 31	160,722	57,372	1,071,177	23,436	46,217	4,704	1,278,116	85,512	1,363,628
Aug. 31	153,527	59,052	1,107,337	22,638	49,099	3,738	1,309,963	85,428	1,395,391
Sept. 30	149,455	64,512	1,199,655	23,562	53,596	6,048	1,402,706	94,122	1,496,828
Oct. 31	145,162	55,566	1,221,850	28,560	54,957	11,046	1,421,969	95,172	1,517,141
Nov. 30	152,685	51,282	1,130,108	28,392	56,850	8,400	1,339,643	88,074	1,427,717
Dec. 31	143,295	54,600	[2] 920,340	26,418	64,543	5,922	1,128,178	86,940	1,215,118

[1] New Basis: To eliminate nonrecoverable stock of LP-gas in underground storage.
[2] Includes 709 million gallons in underground storage.

STORAGE CAPACITY

The total storage capacity for liquefied gases (LP and LR-gases) as of September 30, 1960, was 2,292 million gallons. Facilities were filled to 60 percent of capacity on September 30 and to 48 percent of capacity on December 31, 1960.

TABLE 17.—Liquefied petroleum gas storage capacity, Sept. 30, 1960, and stocks, Dec. 31, 1960

[Thousand gallons]

Refinery district, State and P.A.D. district	Storage Capacity: Above ground at plants & terminals	Storage Capacity: Above-ground at refineries	Storage Capacity: Underground at plants, terminals, & refineries	Storage Capacity: Total	Stocks Dec. 31, 1960
East Coast and Appalachian #1 [1]	4,234	10,752	66,308		
Total P.A.D. District I	4,234	10,752	66,308	81,294	36,615
Ind., Ill., Ky., and App. #2:					
Indiana	(2)	4,410			
Illinois	[2] 15,821	19,698	42,985		
Kentucky	3,664	(3)	(4)		
Ohio		[3] 5,964	(4)		
Michigan	390	6,342	[4] 77,568		
Tennessee		(3)			
Okla., Kans., Minn., and Wisc.:					
Oklahoma	15,941	12,096	6,767		
Kansas	5,880	[5] 4,746	147,445		
Minnesota		3,108			
Missouri, Nebraska, North Dakota, and Iowa	6,328	(5)			
Total P.A.D. District II	48,024	56,364	274,765	379,153	240,311
Texas Inland:					
Panhandle	25,118	(6)	153,755		
East	6,450	(6)			
West	28,252	[6] 6,174	316,857		
Other	17,309	798	68,386		
Texas Gulf	32,204	43,638	594,122		
Louisiana Gulf and Alabama	7,917	[7] 10,836	231,038		
Arkansas and Louisiana Inland:					
Louisiana Inland	6,383	(7)	(8)		
Arkansas	2,023				
Mississippi	759		[8] 131,556		
New Mexico	13,936	(6)	43,062		
Total P.A.D. District III	140,351	61,446	1,538,776	1,740,573	768,625
Rocky Mountain:					
Montana and Utah	1,311	[9] 1,722	11,500		
Wyoming	2,242	2,604			
Colorado	4,325	(9)			
Total P.A.D. District IV	7,878	4,326	11,500	23,704	14,844
West Coast	4,261	27,594	35,700		
Total P.A.D. District V	4,261	27,594	35,700	67,555	38,529
Total United States	204,748	160,482	1,927,049	2,292,279	[10] 1,098,924

[1] Includes Pennsylvania, West Virginia, Delaware, New Jersey, and New York.
[2] Indiana included in Illinois.
[3] Kentucky and Tennessee included in Ohio.
[4] Kentucky and Ohio included in Michigan.
[5] Missouri and North Dakota included in Kansas.
[6] Panhandle, East Texas, and New Mexico included in West Texas.
[7] Louisiana Inland included in Louisiana Gulf and Alabama.
[8] Louisiana Inland included in Mississippi.
[9] Colorado included in Montana and Utah.
[10] Includes 709 million gallons in underground storage at plants and terminals and 99 million gallons in underground storage at petroleum refineries.

PRICES

There was no change in the posted price of natural gasoline to blenders in 1960. According to Platt's Oil Price Handbook, the price for grade 26–70, f. o. b., group 3 basis, was 4.5 cents per gallon, unchanged since 1958. The total value of all grades of natural gasoline at plants in 1960 was 7.0 cents per gallon, 0.1 cent higher than in 1959.

The average posted price of propane at New York Harbor was 8.8 cents per gallon, compared with 9.4 cents per gallon in 1959. The December 1959 average posted price of 9.18 cents per gallon remained unchanged through March, but dropped 1 cent a gallon in April. It remained at that level until September when the price returned to the December 1959 level and was steady for the balance of the year. The average value of LP-gases at plants in 1960 was 4.6 cents per gallon, compared with 4.4 cents in 1959.

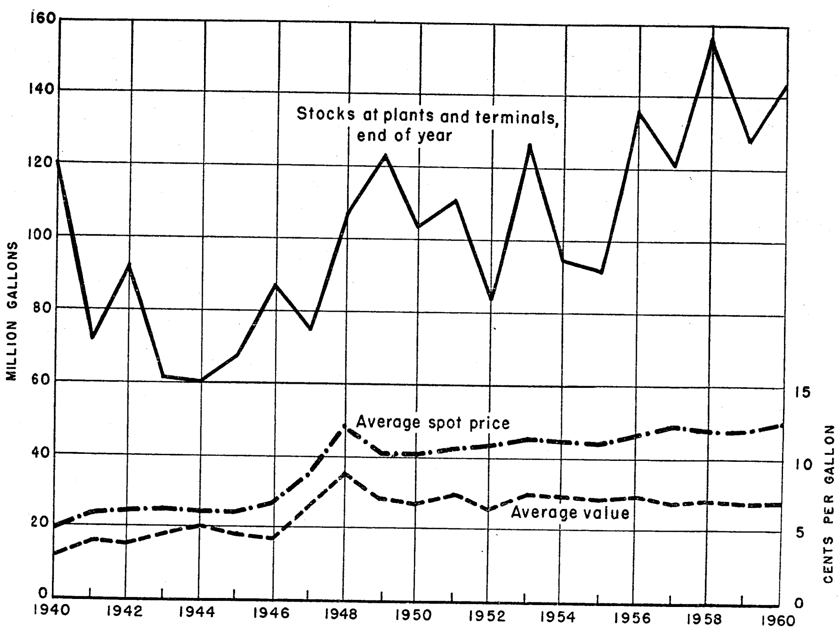

FIGURE 2—Average value of natural gasoline, average spot price of regular 91 octane motor gasoline at Oklahoma refineries, and stocks of natural gasoline and isopentane at plants and terminals.

FOREIGN TRADE [6]

Exports of LP-gases increased from 95 million gallons in 1959 to 126 million in 1960, but exports of natural gasoline declined to only 53,000 gallons. Mexico received 95 percent of the natural gas liquids exported.

The United States imported 69 million gallons of liquefied gases in 1960, most of which originated in Canada. Prior to 1960, these imports were reported as gasoline.

TABLE 18.—LP-gases [1] exported from the United States, by countries

[Thousand gallons [2]]

Country	1951–55 (average)	1956	1957	1958 [3]	1959 [3]	1960 [3]
North America:						
Canada	51,511	55,275	56,274	15,497	3,768	5,251
Cuba	4,536	8,382	10,158	4,032	3,727	1,211
Mexico	57,988	88,779	97,161	88,996	84,965	111,858
Netherlands Antilles	----------	----------	6,728	----------	----------	----------
Other North America:						
Bermuda and Caribbean	1,075	3,015	3,332	1,280	1,118	2,580
Central America	553	2,981	2,809	1,063	278	456
Greenland	----------	31	----------	----------	----------	----------
Total	115,663	158,463	176,462	110,868	93,856	121,356
South America:						
Argentina	2	1,033	107	----------	72	3,818
Brazil	13,651	18,554	11,386	8,756	----------	----------
Other South America	128	348	368	25	95	32
Total	13,781	19,935	11,861	8,781	167	3,850
Europe:						
Denmark	(4)	----------	638	----------	----------	----------
France	276	31	41	(4)	----------	(4)
Germany, West	67	6	4	(4)	132	(4)
Italy	5	125	845	----------	15	21
Sweden	2	12	125	----------	----------	19
Other Europe	34	121	105	11	5	15
Total	384	295	1,758	11	152	55
Asia:						
Israel	6	37	36	----------	50	----------
Japan	180	313	195	12	164	23
Philippines	445	21	38	----------	----------	----------
Other Asia	5	67	15	4	----------	2
Total	636	438	284	16	214	25
Africa	126	307	129	10	----------	6
Oceania	71	68	109	183	140	245
Grand total	130,661	179,506	190,603	119,869	94,529	125,537

[1] Data include LR-gases.
[2] 4.5 pounds=1 gallon.
[3] Because of changes in classification, data not strictly comparable with earlier years.
[4] Less than 1,000 gallons.

Source: Bureau of the Census

[6] Data on exports compiled by Mae B. Price and Elsie D. Jackson, Bureau of Mines, from records of the U.S. Department of Commerce.

TABLE 19.—Natural gasoline exported from the United States, by countries

[Thousand gallons]

Country	1951–55 (average)	1956	1957	1958	1959	1960
Canada	24,228	8,362	1,821	133	67	15
Mexico	8	14	81	8	24	38
Netherlands Antilles	6,788					
Other countries	10,614			7		
Total	41,638	8,376	1,902	148	91	53

Source: Bureau of the Census.

Crude Petroleum and Petroleum Products

By James G. Kirby,[1] Walter G. Messner,[2] and Betty M. Moore [3]

Contents

GENERAL SUMMARY

THE TOTAL demand [4] for petroleum and petroleum products in 1960 was 9,879,000 barrels daily, compared with 9,662,000 barrels per day in 1959. Exports continued to decline and were 4.3 percent below the 1959 level. Product stocks were high at the beginning of the year, and some progress was made in reducing this surplus during the first half. Although demand was lagging, refiners processed crude at record levels from June through October, and stocks climbed upward. Fortunately, extremely cold weather in December created a demand, which required a withdrawal of 1,395,000 barrels a day from refined product stocks, and at the end of 1960 these stocks were 17 million barrels below the December 31, 1959, total.

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[1] Chief, Section of Economic Analysis and Forecast.
[2] Business analyst.
[3] Statistical assistant.
[4] Certain terms, as used in this chapter, are more or less peculiar to the petroleum industry. Principal terms and their meanings follow:

Total demand.—A derived figure representing total new supply plus decreases or minus increases in reported stocks. Because there are substantial secondary and consumers' stocks that are not reported to the Bureau of Mines, this figure varies considerably from consumption.

Domestic demand.—Total demand less exports.

New supply of all oils.—The sum of crude oil production plus production of natural gas liquids, plus benzol (coke-oven) used for motor fuel plus imports of crude oil and other petroleum products.

Transfers.—Crude oil conveyed to fuel oil stocks without processing, or reclassification of products from one product category to another.

All oils.—Crude petroleum, natural gas liquids, and their derivatives.

Principal product.—Gasoline, kerosine, distillate fuel oil, and residual fuel oil.

Exports.—Total shipments from the United States, including shipments to United States territories and possessions.

Barrels.—42 gallons per barrel.

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The total new supply of all oils in the United States in 1960 was 9,796,000 barrels daily. Crude oil production represented 71.8 percent of total new supply, natural-gas liquids 9.6 percent, and imports 18.6 percent.

TABLE 1.—Salient statistics of crude petroleum, refined products, and natural-gas liquids in the United States [1]

	1956 [2]	1957 [2]	1958 [2]	1959 [2]	1959 [3]	1959 [4]	1960 [4 5]
Crude petroleum:							
Domestic production thousand barrels [6]	2,617,283	2,616,901	2,448,987	2,574,403	2,574,590	2,574,590	2,574,933
World production do	6,124,676	6,439,481	6,607,982	7,133,663	7,133,663	7,133,663	7,684,752
United States proportion percent	43	41	37	36	36	36	34
Imports [7] thousand barrels [6]	341,833	373,255	348,007	352,531	352,344	352,344	371,575
Exports [8] do	28,624	50,243	4,346	2,526	2,526	2,526	3,091
Stocks, end of year do	266,014	281,813	262,730	257,117	257,129	257,129	239,800
Runs to stills do	2,905,106	2,890,436	2,789,404	2,917,661	2,917,661	2,917,661	2,952,534
Value of domestic production at wells:							
Total thousand dollars	7,296,760	8,079,259	7,379,973	7,473,041	7,473,336	7,473,336	7,419,382
Average per barrel	$2.79	$3.09	$3.01	$2.90	$2.90	$2.90	$2.88
Total producing oil wells December 31	551,170	569,273	574,903	583,136	583,141	583,141	591,158
Total oil wells completed during year (successful wells)	31,158	28,164	25,262	27,050	27,055	27,055	22,492
Refined products:							
Imports [9] thousand barrels [6]	183,758	201,334	272,582	297,225	297,239	297,239	294,098
Exports [8] do	128,762	156,944	96,292	90,506	85,049	74,541	70,798
Stocks, end of year do	493,818	537,937	503,314	525,053	526,026	526,954	510,004
Output of gasoline do	1,428,807	1,438,140	1,439,511	1,488,860	1,488,860	1,488,860	1,528,246
Yield of gaoline percent	43.4	43.8	45.2	44.9	44.9	44.9	45.2
Average dealers' net price (excluding tax) of gasoline in 55 United State cities cents per gallon [10]	16.34	16.69	16.22	16.09	16.09	16.09	16.08
Completed refineries, end of year	319	318	313	310	310	310	311
Daily crude-oil capacity thousand barrels [6]	9,124	9,408	9,820	9,901	9,901	9,901	10,008
Natural-gas liquids:							
Production thousand barrels [6]	292,727	297,990	294,749	320,757	320,757	320,757	334,531
Stocks, end of year do	20,559	20,156	22,752	24,887	24,887	24,887	28,931

[1] Data including imports and exports, are for the United States.
[2] Excludes Alaska and Hawaii.
[3] Includes Alaska. Excludes Hawaii.
[4] Includes Alaska and Hawaii.
[5] Preliminary figures.
[6] 42 gallons per barrel.
[7] Bureau of Mines data for crude oil and unfinished oils.
[8] U.S. Department of Commerce, except Alaska (before 1959) and Hawaii (before 1960) which are Bureau of Mines data. Exports include shipments to territories.
[9] U.S. Department of Commerce, except unfinished oils.
[10] Platt's Oil Price Handbook.

DEMAND BY PRODUCTS

As most of the indicated consumption of crude oil in the United States is converted into products at refineries, before sale to ultimate consumers, the analysis of demand trends involves consideration of each major product. The fuel oils (residual, distillate, and kerosine) compete directly with natural gas or coal in heating, cooking and industrial uses. Gasoline and diesel fuel are the major fuels in the transportation field, followed by jet fuel (a blend of low-grade gasoline, kerosine, and distillate) used in military jet planes, and straight kerosine, which is used as fuel by commercial jet planes. The other products serve a wide variety of uses in competition with other products as fuel and in special uses outside the fuels field.

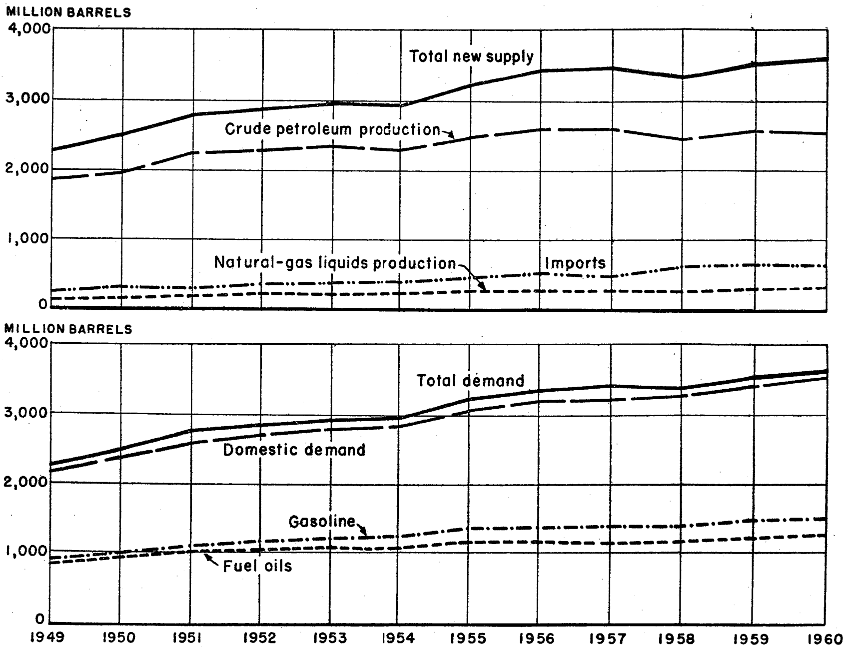

FIGURE 1.—Supply and demand of all oils in the United States, 1949–60.

Gasoline.—The total demand for gasoline increased 1.9 percent in 1960 to 1,530.9 million barrels and represented 42.3 percent of the total demand for all oils. Exports declined 19.6 percent for the year, and domestic demand increased 2.2 percent. A breakdown of domestic demand by uses indicates that civilian highway use accounted for 87.0 percent, aviation gasoline, 3.9 percent, leaving a remainder of 9.1 percent for nonhighway vehicles, military vehicles, stationary vehicles, nonfuel use, and losses. The total demand for gasoline includes aviation gasoline and naphthas.

Distillate Fuel Oil.—The colder than normal weather during the first quarter of 1960 helped to increase the domestic demand for distillate fuel oil by 3.9 percent for the year. Total demand increased only 3.4 percent for the year as exports declined 22.9 percent.

Residual Fuel Oil.—The total demand for residual oil declined 0.9 percent in 1960. Exports were down 10.9 percent for the year, and domestic demand declined 0.6 percent. While total imports of residual increased 5.2 percent in 1960, the part of imports that are controlled by the Oil Imports Administration (residual used as fuel) declined 9.1 percent. Residual imported for bunkering vessels engaged in foreign trade increased 60.5 percent in 1960, and imports by the military for offshore use doubled.

Residual fuel supplied from domestic sources declined from 355.3 million barrels in 1959 to 336.1 million barrels in 1960. Imports supplied 41.8 percent of the domestic demand compared with 39.5 percent in 1959.

TABLE 2.—Supply and demand of all oils in the United States, 1958 total and 1959–60, by months

(Thousand barrels)

	1959 [1]													1958 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	223, 926	201, 435	222, 839	217, 685	223, 806	212, 489	210, 311	209, 733	205, 700	214, 248	209, 449	222, 969	2, 574, 590	2, 448, 987
Natural-gas liquids	26, 690	25, 063	27, 311	26, 158	26, 624	25, 950	26, 185	26, 545	26, 020	27, 449	27, 636	29, 126	320, 757	294, 749
Benzol, etc	37	50	47	30	32	16	25	15	21	17	17	17	324	416
Total production	250, 653	226, 548	250, 197	243, 873	250, 462	238, 455	236, 521	236, 293	231, 741	241, 714	237, 102	252, 112	2, 895, 671	2, 744, 152
Imports: [2]														
Crude petroleum	28, 664	29, 467	28, 113	22, 270	29, 089	36, 147	27, 510	29, 943	29, 486	30, 355	29, 421	31, 879	352, 344	348, 007
Refined products	36, 638	36, 860	40, 741	20, 166	17, 317	20, 942	17, 257	16, 597	20, 726	16, 651	24, 719	28, 625	297, 239	272, 582
Total new supply	315, 955	292, 875	319, 051	286, 309	296, 868	295, 544	281, 288	282, 833	281, 953	288, 720	291, 242	312, 616	3, 545, 254	3, 364, 741
Increase (+) or decrease (−) in stocks	−35, 148	−2, 628	+7, 295	+6, 766	+33, 433	+17, 313	+2, 610	+13, 291	+185	+13, 259	−9, 386	−28, 486	+18, 504	−51, 110
Demand:														
Total demand	351, 103	295, 503	311, 756	279, 543	263, 435	278, 231	278, 678	269, 542	281, 768	275, 461	300, 628	341, 102	3, 526, 750	3, 415, 851
Exports: [3]														
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2, 526	4, 346
Refined products	8, 138	6, 252	7, 480	7, 888	7, 133	7, 590	7, 210	6, 870	6, 628	7, 285	5, 311	7, 264	85, 049	96, 292
Domestic demand:														
Gasoline	114, 993	100, 167	119, 038	125, 017	127, 037	133, 856	137, 260	132, 789	130, 360	120, 881	116, 262	123, 561	1, 481, 221	1, 435, 897
Kerosine	17, 978	13, 102	10, 682	5, 972	4, 006	4, 540	6, 051	4, 357	7, 861	8, 052	11, 709	15, 536	109, 846	113, 279
Distillate fuel oil	95, 307	74, 196	67, 246	47, 662	37, 483	36, 322	34, 133	31, 438	42, 672	46, 084	65, 882	80, 967	659, 392	653, 426
Residual fuel oil	63, 028	57, 558	59, 266	45, 212	38, 208	40, 505	36, 918	35, 152	36, 939	37, 750	49, 416	58, 164	558, 116	531, 067
Jet fuel	7, 983	7, 196	7, 552	8, 576	7, 465	7, 898	8, 975	9, 232	10, 989	9, 339	8, 761	10, 054	104, 020	94, 177
Lubricants	3, 502	2, 750	3, 795	3, 584	3, 827	3, 907	3, 674	3, 561	3, 733	3, 810	3, 304	3, 327	42, 774	39, 472
Miscellaneous	39, 822	34, 185	36, 519	35, 402	38, 009	43, 421	44, 283	45, 906	42, 435	42, 002	39, 851	41, 971	483, 806	447, 895
Total domestic demand	342, 613	289, 154	304, 098	271, 425	256, 035	270, 449	271, 294	262, 435	274, 989	267, 918	295, 185	333, 580	3, 439, 175	3, 315, 213
Stocks:														
Crude petroleum	258, 108	260, 040	254, 940	257, 564	264, 525	272, 505	264, 994	253, 091	250, 996	257, 487	255, 953	257, 129	257, 129	[4] 262, 742
Natural-gas liquids	18, 008	17, 651	19, 524	22, 589	27, 210	29, 976	31, 296	31, 820	32, 759	31, 942	29, 135	24, 887	24, 887	22, 752
Refined products	478, 274	474, 071	484, 593	485, 670	507, 521	514, 088	522, 889	547, 559	548, 900	556, 485	551, 440	526, 026	526, 026	[4] 504, 044
Total stocks	754, 390	751, 762	759, 057	765, 823	799, 256	816, 569	819, 179	832, 470	832, 655	845, 914	836, 528	808, 042	808, 042	[4] 789, 538

	1959 [5]													1958 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,574,590	-----
Natural-gas liquids	26,690	25,063	27,311	26,158	26,624	25,950	26,185	26,545	26,020	27,449	27,636	29,126	320,757	-----
Benzol, etc	37	50	47	30	32	16	25	15	21	17	17	17	324	-----
Total production	250,653	226,548	250,197	243,873	250,462	238,455	236,521	236,293	231,741	241,714	237,102	252,112	2,895,671	-----
Imports:[2]														
Crude petroleum	28,664	29,467	28,113	22,270	29,089	36,147	27,510	29,943	29,486	30,355	29,421	31,879	352,344	-----
Refined products	36,638	36,860	40,741	20,166	17,317	20,942	17,257	16,597	20,726	16,651	24,719	28,625	297,239	-----
Total new supply	315,955	292,875	319,051	286,309	296,868	295,544	281,288	282,833	281,953	288,720	291,242	312,616	3,545,254	-----
Increase (+) or decrease (−) in stocks	−35,027	−2,758	+7,317	+6,928	+33,303	+17,171	+2,608	+13,361	+169	+13,398	−9,409	−28,542	+18,519	-----
Demand:														
Total demand	350,982	295,633	311,734	279,381	263,565	278,373	378,680	269,472	281,784	275,322	300,651	341,158	3,526,735	-----
Exports:[3]														
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2,526	-----
Refined products	7,344	5,488	6,782	6,827	6,275	6,735	6,524	5,721	5,818	6,341	4,277	6,409	74,541	-----
Domestic demand:														
Gasoline	115,175	100,523	119,255	125,375	127,408	134,306	137,609	133,239	130,648	121,221	116,588	123,930	1,485,277	-----
Kerosine	17,989	13,109	10,689	5,976	4,006	4,541	6,063	4,366	7,868	8,052	11,711	15,549	109,919	-----
Distillate fuel oil	95,314	74,248	67,256	47,697	37,532	36,376	34,214	31,514	42,697	46,143	66,001	80,991	659,983	-----
Residual fuel oil	63,485	58,029	59,674	45,698	38,722	40,976	37,140	35,663	37,409	38,107	49,943	58,618	563,464	-----
Jet fuel	7,983	7,196	7,564	8,578	7,492	7,903	8,975	9,254	11,001	9,373	8,814	10,095	104,228	-----
Lubricants	3,508	2,758	3,801	3,587	3,841	3,920	3,682	3,571	3,744	3,819	3,315	3,332	42,878	-----
Miscellaneous	39,832	34,185	36,534	35,413	38,022	43,425	44,299	45,907	42,448	42,008	39,870	41,976	483,919	-----
Total domestic demand	343,286	290,048	304,773	272,324	257,023	271,447	271,982	263,514	275,815	268,723	296,242	334,491	3,449,668	-----
Stocks:														
Crude petroleum	258,108	260,040	254,940	257,564	264,525	272,505	264,994	253,091	250,996	257,487	255,953	257,129	257,129	[6] 262,742
Natural-gas liquids	18,008	17,651	19,524	22,589	27,210	29,976	31,296	31,820	32,759	31,942	29,135	24,887	24,887	22,752
Refined products	479,308	474,975	485,519	486,758	508,479	514,904	523,703	548,443	549,768	557,492	552,424	526,954	526,954	[6] 504,957
Total stocks	755,424	752,666	759,983	766,911	800,214	817,385	819,993	833,354	833,523	846,921	837,512	808,970	808,970	[6] 790,451

See footnotes at end of table.

TABLE 2.—Supply and demand of all oils in the United States, 1958 total and 1959–60, by months—Continued

(Thousand barrels)

	1960 [5] [7]													1959 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	224, 140	209, 986	220, 977	211, 132	212, 296	208, 161	212, 645	215, 145	209, 119	215, 687	213, 992	221, 653	2, 574, 933	2, 574, 590
Natural-gas liquids	29, 242	27, 559	29, 956	28, 118	27, 739	26, 659	27, 866	28, 605	28, 076	29, 715	29, 501	31, 495	344, 531	320, 757
Benzol, etc	16	17	23	48	60	12	18	16	16	17	18	14	275	324
Total production	253, 398	237, 562	250, 956	239, 298	240, 095	234, 832	240, 529	243, 766	237, 211	245, 419	243, 511	253, 162	2, 919, 739	2, 895, 691
Imports: [2]														
Crude petroleum	28, 610	29, 730	29, 292	33, 877	30, 571	32, 730	31, 191	32, 768	32, 691	31, 458	29, 980	28, 677	371, 575	352, 344
Refined products	30, 713	29, 377	29, 966	24, 614	20, 711	23, 483	19, 551	19, 493	20, 634	20, 989	26, 664	27, 903	294, 098	297, 239
Total new supply	312, 721	296, 669	310, 214	297, 789	291, 377	291, 045	291, 271	296, 027	290, 536	297, 866	300, 155	309, 742	3, 585, 412	3, 545, 254
Increase (+) or decrease (−) in stocks	−18, 105	−10, 591	−34, 532	+14, 611	+16, 307	+2, 854	+14, 219	+8, 543	+14, 347	+14, 810	−4, 678	−48, 020	−30, 235	+18, 519
Demand:														
Total demand	330, 826	307, 260	344, 746	283, 178	275, 070	288, 191	277, 052	287, 484	276, 189	283, 056	304, 833	357, 762	3, 615, 647	3, 526, 735
Exports: [3]														
Crude petroleum	264	299	260	270	127	436	248	89	234	352	----------	512	3, 091	2, 526
Refined products	5, 734	5, 505	6, 302	6, 477	6, 421	7, 155	5, 742	5, 938	5, 393	5, 641	5, 164	5, 326	70, 798	74, 541
Domestic demand:														
Gasoline	111, 311	108, 871	120, 497	129, 094	129, 952	138, 909	135, 838	138, 371	128, 530	126, 242	124, 855	124, 937	1, 517, 407	1, 485, 277
Kerosine	14, 753	13, 915	15, 958	7, 668	6, 176	6, 665	8, 067	8, 433	8, 864	10, 475	12, 776	18, 769	132, 519	109, 919
Distillate fuel oil	86, 200	73, 050	87, 137	45, 385	40, 450	39, 755	34, 919	37, 137	39, 683	45, 160	61, 556	95, 544	685, 976	659, 983
Residual fuel oil	61, 581	55, 804	60, 701	45, 840	40, 246	39, 332	36, 834	36, 240	37, 343	40, 849	48, 509	57, 051	560, 330	563, 464
Jet fuel	8, 973	8, 584	8, 903	7, 887	8, 752	9, 255	8, 732	8, 254	8, 723	8, 269	8, 472	8, 265	103, 069	104, 228
Lubricants	3, 284	3, 352	3, 646	3, 604	3, 898	3, 699	3, 791	3, 692	3, 483	3, 479	3, 474	3, 265	42, 667	42, 878
Miscellaneous	38, 726	37, 880	41, 342	36, 953	39, 048	42, 589	42, 881	49, 330	43, 936	42, 589	40, 027	44, 093	499, 790	483, 919
Total domestic demand	324, 828	301, 456	338, 184	276, 431	268, 522	280, 600	271, 062	281, 457	270, 562	277, 063	299, 669	351, 924	3, 541, 758	3, 449, 668
Stocks:														
Crude petroleum	252, 206	257, 028	260, 923	266, 178	261, 312	257, 301	242, 745	234, 091	231, 966	232, 990	239, 528	239, 800	239, 800	257, 129
Natural-gas liquids	22, 406	20, 793	18, 916	22, 215	26, 400	29, 380	32, 467	33, 224	35, 639	36, 122	33, 993	28, 931	28, 931	24, 887
Refined products	516, 253	502, 453	465, 903	471, 960	488, 948	492, 833	518, 521	534, 961	549, 018	562, 321	553, 234	510, 004	510, 004	526, 954
Total stocks	790, 865	780, 274	745, 742	760, 353	776, 660	779, 514	793, 733	802, 276	816, 623	831, 433	826, 755	778, 735	778, 735	808, 970

[1] Includes Alaska.
[2] Bureau of Mines data for crude oil and unfinished oils, U.S. Department of Commerce data for all other imports.
[3] U.S. Department of Commerce except for shipments to Hawaii in 1959, which are Bureau of Mines data.
[4] Includes stocks located at bulk terminals in Alaska: Crude, 12,000 barrels; gasoline, 244,000 barrels; kerosine, 9,000 barrels; distillate fuel oil, 407,000 barrels; residual fuel oil, 52,000 barrels; jet fuel oil, 16,000 barrels; and lubricants, 2,000 barrels.
[5] Includes Alaska and Hawaii. See tables 4 and 5 for 1959 details.
[6] Includes stocks located at bulk terminals in Alaska for crude and products (see footnote 4), and stocks located at bulk terminals in Hawaii: gasoline, 411,000 barrels; kerosine, 26,000 barrels; distillate fuel oil, 104,000 barrels; residual fuel oil, 363,000 barrels; and jet fuel, 9,000 barrels.
[7] Preliminary figures.

Kerosine.—The total demand for kerosine in 1960 was 133.2 million barrels. This includes 33.2 million barrels of fuel used in commercial jet and turbojet aircraft. In prior years some of the straight kerosine used by commercial jets was reported to the Bureau of Mines under the jet fuel classification so a comparison of demand with previous years is difficult.

Other Products.—Included with all other products are crude-oil exports and losses and refinery shortage and overage. The total demand for this group was 3.1 percent higher in 1960. With the exception of jet fuel and road oil, demand for all products in this group increased over the preceding year. Exports for these products were 21.5 percent higher than a year ago, and domestic demand increased 2.3 percent. The precentage of change (increase or decrease) for 1960 in domestic demand for the individual products in this group is as follows: Coke, +53.2 percent; miscellaneous oils, +8.8 percent; liquefied gases, +6.2 percent; asphalt, +2.2 percent; still gas, +2.0 percent; road oil, −6.0 percent; wax, −2.6 percent; jet fuel, −1.1 percent; and lubricating oils, −0.5 percent. The net crude oil and refinery loss for the year showed an average of 50.0 million barrels, 81.9 percent higher than in 1959. The high increase in the demand for petroleum coke is due to better reporting of nonmarketable catalyst coke, which is used at the refineries.

TABLE 3.—Demand for all oils [1] in the United States

(Million barrels)

Year	Domestic demand	Exports	Total demand	Year	Domestic demand	Exports	Total demand
1951	2,569.8	154.1	2,723.9	1957	3,218.6	207.2	3,425.8
1952	2,664.4	158.2	2,822.6	1958	3,315.2	100.6	3,415.8
1953	2,775.3	146.6	2,921.9	1959 [2]	3,433.9	92.9	3,526.8
1954	2,832.4	129.7	2,962.1	1959 [3]	3,439.2	87.6	3,526.8
1955	3,087.8	134.2	3,220.0	1959 [4]	3,449.6	77.1	3,526.7
1956	3,213.2	157.4	3,370.6	1960 [4] [5]	3,541.7	73.9	3,615.6

[1] See text footnote 4 at beginning of this chapter.
[2] Excluding Alaska and Hawaii.
[3] Including Alaska.
[4] Including Alaska and Hawaii.
[5] Preliminary figures.

Shipments to U.S. Territories and Possessions.—Domestic demand, as defined in this chapter, refers to demand in all States of the United States. Alaskan demand for petroleum is included with these States, beginning with 1959, and Hawaiian demand is included with the 1960 data. Shipments from the United States to Territories and possessions are included with exports. Any foreign receipts into these Territories and possessions are not included in the total imports shown.

Shipments from Territories and possessions to foreign countries are excluded from total exports. Shipments to the United States are included in imports.

Separate supply and demand balances for the year 1959 are shown on table 4 for Alaska, and table 5 for Hawaii.

TABLE 4.—Salient statistics for crude petroleum and petroleum products in Alaska, by months, 1959

(Thousand barrels)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Crude petroleum:													
Production	26	15	3	------	4	16	21	18	17	22	21	24	187
Stocks	6	6	1	------	4	9	6	12	8	8	8	12	12
Petroleum products:													
Receipts from West Coast:													
Gasoline	125	96	184	305	97	210	256	249	181	133	97	156	2,089
Kerosine	4	------	3	2	------	1	1	5	3	------	7	2	28
Distillate fuel oil	193	210	237	326	221	293	225	278	297	138	179	260	2,857
Residual fuel oil	16	42	49	3	87	5	87	73	42	56	91	59	610
Jet fuel	------	7	1	7	------	7	3	15	4	7	16	4	71
Lubricants	5	1	3	4	5	5	6	4	4	2	3	2	44
Asphalt	------	------	------	1	26	4	18	------	------	------	------	8	57
Total	343	356	477	648	436	525	596	624	531	336	393	491	5,756
Imports from foreign countries: Gasoline	1	2	2	1	1	------	1	1	2	------	2	1	14
Exports to foreign countries:													
Gasoline	4	9	5	6	6	11	8	14	11	5	8	4	91
Distillate fuel oil	42	44	26	13	12	16	6	6	13	1	18	11	208
Total	46	53	31	19	18	27	14	20	24	6	26	15	299
Bulk terminal stocks in Alaska:[1]													
Gasoline	263	269	324	407	342	352	347	336	301	340	319	333	333
Kerosine	11	11	14	16	14	15	11	12	12	9	16	17	17
Distillate fuel oil	368	365	494	539	513	536	479	432	484	435	413	481	481
Residual fuel oil	54	54	83	78	94	89	79	91	86	92	93	117	117
Jet fuel	16	16	16	14	12	12	15	30	18	15	18	13	13
Lubricants	2	1	2	2	3	3	3	3	3	3	3	3	3
Asphalt	------	------	------	------	21	19	24	19	3	1	1	9	9
Total	714	716	933	1,056	999	1,026	958	923	907	895	863	973	973
Domestic demand, Alaska:													
Gasoline	103	83	126	217	157	189	254	247	207	89	112	139	1,923
Kerosine	2	------	------	------	2	------	5	4	3	3	------	1	20
Distillate fuel oil	190	169	82	268	235	254	276	319	232	186	183	181	2,575
Residual fuel oil	14	42	20	8	71	10	97	61	47	50	90	35	545
Jet fuel	------	7	1	9	2	7	------	------	16	10	13	9	74
Lubricants	5	2	2	4	4	5	6	4	4	2	3	2	43
Asphalt	------	------	------	1	5	6	13	5	16	2	------	------	48
Total	314	303	231	507	476	471	651	640	525	342	401	367	5,228

[1] Alaska stocks on Dec. 31, 1958, as follows: Crude oil, 12,000 barrels; gasoline, 244,000 barrels; kerosine, 9,000 barrels; distillate fuel oil, 407,000 barrels; residual fuel oil, 52,000 barrels; jet fuel, 16,000 barrels; and lubricants, 2,000 barrels.

TABLE 5.—Salient statistics for petroleum products, in Hawaii, by months, 1959

(Thousand barrels)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Receipts from West Coast:													
Gasoline	370	238	229	421	350	400	314	485	256	434	320	327	4,144
Kerosine	19	------	12	7	------	8	7	7	8	2	7	9	86
Distillate fuel oil	28	35	7	52	29	61	65	78	38	75	136	20	624
Residual fuel oil	361	483	415	567	425	366	274	546	470	370	497	451	5,225
Jet fuel	------	------	13	1	27	5	2	22	14	48	46	38	216
Lubricants	6	8	6	3	14	13	8	10	11	9	11	5	104
Wax	------	------	1	1	1	------	------	------	------	------	------	------	3
Asphalt	10	------	14	6	11	2	15	------	12	5	19	5	99
Other products	------	------	1	4	1	1	1	1	1	1	------	------	11
Total	794	764	698	1,062	858	856	686	1,149	810	944	1,036	855	10,512
Exports to foreign countries:													
Gasoline	------	------	------	------	------	1	------	------	------	------	------	------	1
Distillate fuel oil	------	------	------	1	------	------	------	------	------	------	2	------	3
Total	------	------	------	1	------	1	------	------	------	------	2	------	4
Bulk terminal stocks in Hawaii:[1]													
Gasoline	599	481	493	556	535	484	449	484	452	546	540	498	498
Kerosine	34	27	32	35	35	42	37	35	36	38	43	39	39
Distillate fuel oil	125	108	105	121	101	108	92	94	107	123	138	134	134
Residual fuel oil	267	279	286	367	278	173	225	260	260	273	243	240	240
Jet fuel	9	9	10	9	9	9	11	11	13	27	20	17	17
Total	1,034	904	926	1,088	958	816	814	884	868	1,007	984	928	928
Domestic demand, Hawaii:													
Gasoline	182	356	217	358	371	450	349	450	288	340	326	369	4,056
Kerosine	11	7	7	4	------	1	12	9	7	------	2	13	73
Distillate fuel oil	7	52	10	35	49	54	81	76	25	59	119	24	591
Residual fuel oil	457	471	408	486	514	471	222	511	470	357	527	454	5,348
Jet fuel	------	------	12	2	27	5	------	22	12	34	53	41	208
Lubricants	6	8	6	3	14	13	8	10	11	9	11	5	104
Wax	------	------	1	1	1	------	------	------	------	------	------	------	3
Asphalt	10	------	14	6	11	2	15	------	12	5	19	5	99
Other products	------	------	1	4	1	1	1	1	1	1	------	------	11
Total	673	894	676	899	988	997	688	1,079	826	805	1,057	911	10,493

[1] Stocks on Dec. 31, 1958 as follows: Gasoline, 411,000 barrels; kerosine, 26,000 barrels; distillate fuel oil, 104,000 barrels; residual fuel oil, 363,000 barrels; and jet fuel, 9,000 barrels.

SCOPE OF REPORT

This report deals primarily with statistics for production, refining, distribution, and indicated consumption of crude petroleum and refined products in the United States. The object of limiting data to the United States is to permit a breakdown and balancing of supply and demand of operations by States and districts. The composition of the districts used by the Bureau of Mines is explained in the next section.

The increasing volume of natural-gas liquids recovered from natural gas has made it necessary to present data on these liquids with the crude oil data, as they are either blended with refinery products or are identical with materials recovered from refinery gases. These natural-gas liquids are recovered at special plants away from the oil refineries.

Most of the data were compiled by the Bureau of Mines from detailed reports, submitted on a voluntary basis by the various companies. These data are published monthly for release about 8 weeks after the end of the month concerned. Complete coverage, with only minor estimates, is procured for production, stocks, and refinery operations. The Bureau of Mines used the import data as reported by the refineries for crude oil and unfinished oils. Other product imports and all export data were taken from records of the U.S. Department of Commerce.

The impossibility of contracting many small producers to obtain current monthly data for crude-oil production makes it necessary to use pipeline company reports. These companies report by States of origin, stocks on leases, oil taken from the leases, pipeline and tank farm stocks, and crude deliveries. The data are cross-checked against reports from refineries showing crude receipts by States of origin and method of transportation. These reports include information covering final receipts by water, tank cars, and trucks and cover stocks of crude oil, held at refineries, by States of origin. The data are checked further against available current and annual production figures collected by State agencies and supplemented by estimates of unreported lease stocks. The Bureau of Mines crude production figure includes field condensate.

Individual refineries reported monthly receipts, input, stocks at the beginning and end of the month, refinery production, and deliveries. Data on both product stocks at refineries and pipeline and bulk terminal stocks are collected.

Annual canvasses provide supplemental information on the value of crude petroleum at wells, the number of producing oil wells, sales of fuel oils, asphalt and road oils by uses, and refinery capacity. The table showing world production of crude oil by countries is based on monthly reports, which also included data on crude movements and refinery operations. Data on crude reserves, wells drilled, and current prices were taken from the sources indicated in the footnotes.

DISTRICTS

The Bureau of Mines reported production of crude petroleum and natural-gas liquids and the number of wells drilled by States. Louisiana, New Mexico, and Texas were also reported by districts.

Louisiana is divided into a Northern Louisiana district and a Louisiana Gulf Coast district. The Gulf Coast district includes Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, and Washington Parishes and all parishes in the State south of these. All parishes not included in the Gulf Coast district are in the Northern Louisiana district.

New Mexico has two widely separated producing areas. The Southeastern district comprises mainly Lea, Eddy, Chaves, and Roosevelt Counties. The Northwestern district comprises mainly San Juan, Rio Arriba, Sandoval and McKinley Counties.

The Bureau of Mines producing districts in Texas correspond, with one exception, to groupings of the Texas Railroad Commission districts.

Bureau of Mines districts:	*Railroad Commission district*
Gulf Coast	Nos. 2 and 3
West Texas	Nos. 7C and 8
East Proper	Part of No. 6 (East Texas field in Cherokee, Smith, Upshur, Rush and Gregg Counties)
Panhandle	No. 10
Rest of State:	
North	Nos. 7B and 9
Central	No. 1
South	No. 4
Other East Texas	Nos. 5 and 6 (exclusive of East Proper)

The Bureau of Mines groups refinery operations into another set of districts called refining districts. These refining districts correspond with the grouping originated by the Petroleum Administration for War during World War II and called PAW districts (later changed to PAD districts).

PAD district:	*Refining districts*
1	*East Coast*—District of Columbia and Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida, and the following counties of New York: Cayuga, Tompkins, Chemung and all counties east and north thereof, and the following counties of Pennsylvania: Bradford, Sullivan, Columbia, Montour, Northumberland, Dauphin, York, and all counties east thereof.
1	*Appalachian No. 1*—West Virginia and those parts of Pennsylvania and New York not included in the East Coast district.
2	*Appalachian No. 2*—The following counties of Ohio: Erie, Huron, Crawford, Marion, Delaware, Franklin, Pickaway, Ross, Pike, Scioto, and all counties east thereof.
2	*Indiana-Illinois-Kentucky*—Indiana, Illinois, Kentucky, Tennessee, Michigan, and that part of Ohio not included in the Appalachian district.
2	*Oklahoma-Kansas-Missouri*—Oklahoma, Kansas, Missouri, Nebraska, and Iowa.
2	*Minnesota-Wisconsin-North Dakota-South Dakota*—Minnesota, Wisconsin, North Dakota, and South Dakota.
3	*Texas Inland*—Texas, except Texas Gulf Coast district.
3	*Texas Gulf Coast*—The following counties of Texas: Newton, Orange, Jefferson, Jasper, Tyler, Hardin, Liberty, Chambers, Polk, San Jacinto, Montgomery, Harris, Galveston, Waller, Fort Bend, Brazoria, Wharton, Matagorda, Jackson, Victoria, Calhoun, Refugio, Aransas, San Patricio, Nueces, Kleberg, Kenedy, Willacy, and Cameron.
3	*Louisiana Gulf Coast*—The following parishes of Louisiana: Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, Washington, and all parishes south thereof; the following counties of Mississippi: Pearl River, Stone, George, Hancock, Harrison, and Jackson, and Mobile and Baldwin Counties, Alabama.
3	*North Louisiana-Arkansas*—Arkansas and those parts of Louisiana, Mississippi and Alabama not included in the Louisiana Gulf Coast district.
3	*New Mexico*—New Mexico.
4	*Rocky Mountain*—Montana, Idaho, Wyoming, Utah, and Colorado.
5	*West Coast*—Washington, Oregon, California, Nevada, Alaska, Arizona, and Hawaii.

WORLD OIL SUPPLY

Crude production for the world in 1960 was 7,684 million barrels, an increase of 7.7 percent over 1959. The United States' share of the total production declined from 36.1 percent in 1959 to 33.5 percent in 1960.

The world demand for petroleum increased 8.1 percent in 1960 (from 7,194 million barrels in 1959 to 7,775 million in 1960).

RESERVES

The American Petroleum Institute Committee on Petroleum Reserves estimated proved reserves of crude oil in the United States to be 31.6 billion barrels on Dec. 31, 1960, a decrease of 0.1 billion for the year.

The estimates of crude-oil reserves include only oil recoverable under existing economic and operating conditions.

TABLE 6.—Estimates of proved crude oil reserves in the United States on December 31, 1953–60, by States [1]

(Million barrels)

State	1953	1954	1955	1956	1957	1958	1959	1960
Eastern States:								
Illinois	625	658	691	700	655	608	594	556
Indiana	62	67	62	68	67	71	74	66
Kentucky	82	85	107	149	138	126	136	129
Michigan	61	60	59	55	49	45	55	78
New York	49	46	43	40	37	36	34	32
Ohio	32	37	56	64	68	71	74	75
Pennsylvania	111	102	93	135	126	120	114	108
West Virginia	36	37	47	51	53	52	51	51
Total	1,058	1,092	1,158	1,262	1,193	1,129	1,132	1,095
Central and Southern States:								
Arkansas	358	351	330	318	305	318	313	302
Kansas	913	979	998	992	947	922	917	884
Louisiana [2]	2,760	2,962	3,255	3,675	3,858	4,044	4,660	4,785
Mississippi	350	412	388	368	360	379	389	407
Nebraska	26	38	57	63	63	69	81	86
New Mexico	815	806	820	836	832	894	1,026	1,084
North Dakota	128	134	185	196	258	314	382	431
Oklahoma	1,752	1,955	2,016	2,010	1,941	1,898	1,865	1,791
Texas [2]	14,999	14,982	14,934	14,783	14,555	14,322	14,860	14,758
Total	22,101	22,619	22,983	23,241	23,119	23,160	24,493	24,528
Mountain States:								
Colorado	319	329	334	364	310	392	381	364
Montana	209	272	299	331	320	338	309	267
Utah	38	36	37	61	140	199	195	208
Wyoming	1,279	1,304	1,374	1,363	1,420	1,409	1,403	1,427
Total	1,845	1,941	2,044	2,119	2,190	2,338	2,288	2,266
Pacific Coast States: California [2]	3,920	3,889	3,801	3,771	3,760	3,866	3,763	3,659
Other States [3]	21	20	26	42	38	43	43	65
Total United States	28,945	29,561	30,012	30,435	30,300	30,536	31,719	31,613

[1] From reports of Committee on Petroleum Reserves, American Petroleum Institute. Includes crude oil that may be extracted by present methods from fields completely developed or sufficiently explored to permit reasonably accurate calculations. The change in reserves during any year represents total new discoveries, extensions, and revisions, minus production.

[2] Includes offshore reserves.

[3] Includes Alabama, Arizona, Florida, Missouri Nevada, South Dakota, Tennessee, Virginia, Washington, and Alaska for 1959–60, only.

CRUDE PETROLEUM

SUPPLY AND DEMAND

The new supply of crude petroleum is derived mainly from domestic production, but the supply is augmented by imports. Crude imports represented 12.6 percent of the crude supply in 1960, compared with 12.0 percent in 1959. Under the mandatory import control program, which became effective March 1959, imports of crude oil and unfinished oils for further processing are limited to a percentage of the estimated total demand for all products in all States east of the Rocky Mountains. In States west of the Rocky Mountains, including Alaska and Hawaii, the quota is based on the difference between the estimated available domestic supply and the forecast of total demand. Overland receipts (imports from Canada and Mexico) are exempted from provisions of the program. All refineries of record are granted an allocation based on their refinery throughout, with certain special provisions for refineries who imported crude oil during 1957, the base year for the program.

The major part of the indicated demand for crude petroleum is converted into products before final consumption (99.6 percent in 1960) and the remainder represents exports, fuel and losses.

TABLE 7.—Supply and demand [1] for crude petroleum in the United States

(Thousand barrels)

	1956	1957	1958	1959 [2]	1959 [3]	1960 [4] [5]
Production	2,617,283	2,616,901	2,448,987	2,574,403	2,574,590	2,574,933
Imports [6]	341,833	373,255	348,007	352,531	352,344	371,575
Total new supply	2,959,116	2,990,156	2,796,994	2,926,934	2,926,934	2,946,508
Increase (+) or decrease (−) in stocks, end of year	+404	+15,799	−19,083	−5,613	−5,613	−17,329
Demand:						
Domestic crude	2,616,826	2,605,781	2,466,357	2,578,016	2,578,203	2,592,289
Foreign crude	341,886	368,576	349,720	354,531	354,344	371,548
Total demand	2,958,712	2,974,357	2,816,077	2,932,547	2,932,547	2,963,837
Runs to stills:						
Domestic	2,563,655	2,529,672	2,444,229	2,565,504	2,565,504	2,581,568
Foreign	341,451	360,764	345,175	352,157	352,157	370,966
Exports [7]	28,624	50,243	4,346	2,526	2,526	3,091
Transfers to fuel oil:						
Distillate	1,375	1,305	950	970	970	1,001
Residual	6,439	13,884	10,965	7,386	7,386	3,948
Other fuel losses	17,168	18,489	10,412	4,004	4,004	3,263
Total demand	2,958,712	2,974,357	2,816,077	2,932,547	2,932,547	2,963,837

[1] For definition, see footnote 4 at the beginning of this chapter.
[2] Excludes Alaska and Hawaii.
[3] Includes Alaska. There was no crude oil production in Hawaii.
[4] Preliminary figures.
[5] Includes Alaska and Hawaii.
[6] Bureau of Mines data.
[7] U.S. Department of Commerce.

TABLE 8.—Supply of and demand for crude petroleum in the United States, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959: [1]													
Supply:													
Production	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,574,590
Imports [2]	28,664	29,467	28,113	22,270	29,089	36,147	27,510	29,943	29,486	30,355	29,421	31,879	352,344
Total new supply	252,590	230,902	250,952	239,955	252,895	248,636	237,821	239,676	235,186	244,603	238,870	254,848	2,926,934
Change in stocks, end of period:													
Domestic	−2,390	−632	−3,807	4,442	5,016	3,366	−3,050	−11,962	−2,603	6,484	448	1,075	−3,613
Foreign	−2,244	2,564	−1,293	−1,818	1,945	4,614	−4,461	59	508	7	−1,982	101	−2,000
Demand:													
Domestic	226,316	202,067	226,646	213,243	218,790	209,123	213,361	221,695	208,303	207,764	209,001	221,894	2,578,203
Foreign	30,908	26,903	29,406	24,088	27,144	31,533	31,971	29,884	28,978	30,348	31,403	31,778	354,344
Runs to stills:													
Domestic	224,820	201,114	225,553	212,080	217,657	208,102	212,355	220,664	207,369	206,740	208,118	220,932	2,565,504
Foreign	30,304	26,448	28,869	23,902	27,132	31,505	31,961	29,844	28,957	30,326	31,399	31,510	352,157
Exports [3]	352	97	178	230	267	192	174	237	151	258	132	258	2,526
Transfers:													
Distillate	89	83	89	82	81	79	75	74	72	77	79	90	970
Residual	1,053	898	1,038	731	485	480	457	448	442	414	378	562	7,386
Losses	606	330	325	306	312	298	310	312	290	297	298	320	4,004
1960: [4] [5]													
Supply:													
Production	224,140	209,986	220,977	211,132	212,296	208,161	212,645	215,145	209,119	215,687	213,992	221,653	2,574,933
Imports [2]	28,610	29,730	29,292	33,877	30,571	32,730	31,191	32,768	32,691	31,458	29,980	28,677	371,575
Total new supply	252,750	239,716	250,269	245,009	242,867	240,891	243,836	247,913	241,810	247,145	243,972	250,330	2,946,508
Change in stocks, end of period:													
Domestic	−4,802	4,029	5,220	157	−2,498	−4,250	−12,342	−8,644	−2,781	2,173	4,821	1,561	−17,356
Foreign	−121	793	−1,325	5,098	−2,368	239	−2,214	−10	656	−1,149	1,717	−1,289	27
Demand:													
Domestic	228,942	205,957	215,757	210,975	214,794	212,411	224,987	223,789	211,900	213,514	209,171	220,092	2,592,289
Foreign	28,731	28,937	30,617	28,779	32,939	32,491	33,405	32,778	32,035	32,607	28,263	29,966	371,548
Runs to stills:													
Domestic	227,966	204,977	214,869	210,071	214,029	211,395	224,140	223,016	211,042	212,596	208,466	219,001	2,581,568
Foreign	28,693	28,903	30,554	28,738	32,818	32,378	33,382	32,732	31,957	32,561	28,323	29,927	370,966
Exports [3]	264	299	260	270	127	436	248	89	234	352	----------	512	3,091
Transfers:													
Distillate	173	81	78	78	72	70	72	79	73	69	74	82	1,001
Residual	296	371	341	333	411	350	263	366	357	268	334	258	3,948
Losses	281	263	272	264	276	273	287	285	272	275	237	278	3,263

[1] Including Alaska. There was no crude oil produced or processed in Hawaii.
[2] Bureau of Mines figures.
[3] U.S. Department of Commerce.
[4] Preliminary figures.
[5] Including Alaska and Hawaii.

TABLE 9.—Petroleum produced in the United States, by States [1]

(Thousand barrels unless otherwise stated)

	1956	1957	1958	1959	1960 [2]	1859–1960 total
Production:						
Alabama	3,069	5,406	5,887	5,524	7,257	36,760
Alaska				187	558	745
Arkansas	29,355	31,047	28,700	26,329	28,953	1,087,041
California	350,754	339,646	313,672	308,946	304,356	12,026,670
Colorado	58,516	54,982	48,736	46,440	47,165	594,663
Florida	479	461	449	424	368	6,529
Illinois	82,346	77,083	80,275	76,727	78,840	2,229,353
Indiana	11,513	12,662	11,864	11,554	11,590	318,159
Kansas	124,204	123,614	119,942	119,543	113,455	[3] 3,311,717
Kentucky	17,628	17,029	17,509	27,272	21,144	[4] 416,974
Louisiana	299,421	329,896	313,891	362,666	394,360	5,508,883
Michigan	10,740	10,169	9,308	10,439	15,665	[5] 441,326
Mississippi	40,824	38,922	39,512	49,620	51,819	685,245
Montana	21,760	27,172	27,957	29,857	30,240	365,529
Nebraska	16,204	19,586	20,373	22,881	24,428	140,055
Nevada	64	44	40	32	25	302
New Mexico	87,893	94,759	98,515	105,692	107,940	[6] 1,516,253
New York	2,748	2,677	1,763	1,970	1,801	[7] 196,017
North Dakota	13,495	13,259	14,259	17,824	21,954	104,716
Ohio	4,785	5,478	6,260	5,978	4,960	666,757
Oklahoma	215,862	214,661	200,699	198,090	192,288	8,225,771
Pennsylvania	8,230	8,179	6,472	6,160	6,258	1,221,629
Texas	1,107,808	1,073,867	940,166	971,978	933,632	23,834,878
Utah	2,466	4,367	24,811	39,959	37,599	[8] 119,895
West Virginia	2,179	2,215	2,186	2,184	2,318	465,661
Wyoming	104,830	109,584	115,572	126,050	135,521	1,920,982
Other States [9]	110	136	[10] 169	264	439	3,410
Total	2,617,283	2,616,901	2,448,987	2,574,590	2,574,933	65,445,920
Value at wells:						
Total (thousand dollars)	7,296,760	8,079,259	7,379,973	7,473,336	7,419,382	127,037,618
Average per barrel	$2.79	$3.09	$3.01	$2.90	$2.88	$1.94

[1] For detailed figures by States, 1859–1935, see Minerals Yearbook, 1937, p. 1008.
[2] Preliminary figures.
[3] Oklahoma included with Kansas in 1905 and 1906.
[4] Includes Tennessee, 1883–1907.
[5] Figures represent 1925–60 production only; earlier years included with "Other States."
[6] Figures represent 1924–60 production only; earlier years included with "Other States."
[7] Early production in New York included with Pennsylvania.
[8] Figures represent 1946–60 production only; earlier years included with "Other States."
[9] Includes Alaska 1912–33; Arizona, 1958–60; Arkansas, 1920; Michigan, 1900–1919; Mississippi, 1933–35; Missouri, 1899–1911; 1913–16, 1919–23, 1932–59; New Mexico, 1913, 1919–23; South Dakota, 1955–59; Tennessee, 1916–60; Utah, 1907–11, 1920, 1924–41; Virginia, 1943–60; Washington, 1958–60.
[10] Does not include 29,000 barrels produced in Alaska.

PRODUCTION

GENERAL

Crude oil production totaled 2,574.9 million barrels in 1960 compared with 2,574.6 million in 1959. On a daily basis, the 1960 production of 7,035,000 barrels was 19,000 barrels daily less than the 1959 daily average. The demand for domestic crude oil in 1960 was higher than the production resulting in a reduction in domestic crude oil stocks of 47,000 barrels daily for the year.

The seven States, which annually produce in excess of 100 million barrels of crude oil (Texas, Louisiana, California, Oklahoma, Wyoming, Kansas, and New Mexico), supplied 84.7 percent of the United States total in 1960 compared with 85.2 percent in 1959.

BY STATES

Additional data on production by States will be found in volume III of the Minerals Yearbook.

TABLE 10.—Production of crude petroleum in the United States in 1959–60, by States and months [1]

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959:													
Alabama	514	308	369	474	495	488	534	427	445	505	457	508	5,524
Arkansas	2,510	2,116	2,276	2,433	2,490	2,439	2,212	1,950	2,005	1,940	1,883	2,075	26,329
California [2]	26,324	23,621	26,273	25,404	26,403	25,619	26,313	26,223	25,344	26,082	25,295	26,045	308,946
Colorado [3]	3,909	3,609	3,967	3,845	3,899	3,753	3,857	3,942	3,814	4,007	3,819	4,019	46,440
Florida	39	29	37	36	36	36	34	36	34	37	34	36	424
Illinois	6,764	5,999	6,393	6,358	6,285	6,263	6,442	6,447	6,268	6,529	6,297	6,682	76,727
Indiana	1,004	839	977	941	1,130	931	1,005	959	908	959	902	999	11,554
Kansas [4]	10,087	9,551	10,530	10,302	9,906	9,842	9,896	9,575	9,779	10,094	9,740	10,241	119,543
Kentucky	2,060	1,868	2,204	2,509	2,711	2,598	2,449	2,275	2,239	2,235	2,048	2,076	27,272
Louisiana [5]	30,034	27,075	29,163	29,163	30,271	29,373	30,698	31,041	30,225	31,753	31,130	32,740	362,666
Michigan [6]	780	714	815	828	810	865	880	892	885	917	981	1,072	10,439
Mississippi	3,758	3,534	3,972	3,944	4,147	4,083	4,296	4,367	4,302	4,472	4,281	4,464	49,620
Montana [7]	2,441	2,304	2,577	2,415	2,399	2.518	2,621	2,543	2,505	2,523	2,423	2,588	29,857
Nebraska	1,770	1,527	1,559	1,822	2,016	2,008	1,969	2,107	2,032	2,080	1,974	2,017	22,881
New Mexico	8,489	7,819	8,980	8,907	8,921	8,830	9,086	8,828	8,780	8,950	8,877	9,225	105,692
New York	187,	142	158	159	157	169	167	166	165	167	163	170	1,970
North Dakota [8]	1,463	1,373	1,589	1,418	1,443	1,535	1,536	1,501	1,490	1,135	1,466	1,875	17,824
Ohio	470	469	519	531	489	522	534	499	505	494	451	495	5,978
Oklahoma	17,618	15,732	17,587	17,279	17,114	16,204	15,681	15,400	15,318	16,386	16,538	17,233	198,090
Pennsylvania	479	456	498	515	511	520	518	504	530	538	532	559	6,160
Texas	89,292	79,903	88,122	84,490	88,251	79,746	74,871	75,413	74,270	77,900	76,514	83,206	971,978
Utah [9]	3,327	3,021	3,443	3,227	3,365	3,535	3,509	3,351	3,220	3,306	3,140	3,515	39,959
West Virginia	171	167	182	189	175	189	189	178	189	194	171	190	2,184
Wyoming	10,395	9,233	10,631	10,481	10,361	10,390	10,973	11,059	10,394	10,984	10,271	10,878	126,050
Other States	41	26	18	15	21	33	41	50	54	61	62	61	[10] 483
Total: 1959	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,547,590
1958	213,280	190,947	194,580	189,014	193,205	190,172	203,701	215,030	212,642	215,887	209,252	221,277	2,448,987
Daily average, 1959	7,223	7,194	7,188	7,256	7,220	7,083	6,784	6,766	6,857	6,911	6,982	7,193	6,980
Pennsylvania grade (included above)	952	886	970	990	964	1,011	1,015	984	1,012	1,025	976	1,046	11,831
1960: [11]													
Alabama	491	441	537	583	679	649	658	657	636	665	626	635	7,257
Arkansas	2,184	2,368	2,400	2,372	2,585	2,323	2,443	2,428	2,397	2,539	2,446	2,468	28,953
California [2]	25,695	24,003	25,746	25,040	25,891	25,121	25,861	25,685	24,784	25,821	25,024	25,685	304,356
Colorado [3]	3,965	3,699	3,989	3,831	3,962	3,846	3,981	3,895	3,920	4,056	3,914	4,107	47,165
Florida	35	35	36	30	31	28	31	30	27	28	27	30	368
Illinois	6,875	6,170	6,505	6,458	6,635	6,589	6,616	6,767	6,547	6,716	6,538	6,424	78,840
Indiana	1,009	939	950	957	971	911	960	1,075	942	951	951	974	11,590
Kansas [4]	9,733	8,942	9,255	9,395	9,550	9,086	9,410	9,786	9,451	9,610	9,569	9,668	113,455

Kentucky	1,973	1,725	1,744	1,848	1,879	1,839	1,736	1,873	1,669	1,717	1,596	1,545	21,144
Louisiana [5]	33,622	31,299	33,715	32,504	32,046	31,203	32,524	32,586	31,582	34,154	33,699	35,426	394,360
Michigan [6]	1,027	1,021	1,177	1,171	1,011	1,257	1,300	1,456	1,441	1,614	1,535	1,655	15,665
Mississippi	4,651	4,176	4,189	4,098	4,492	4,206	4,223	4,305	4,198	4,345	4,395	4,541	51,819
Montana [7]	2,556	2,466	2,543	2,443	2,410	2,425	2,604	2,617	2,519	2,599	2,509	2,549	30,240
Nebraska	1,987	1,818	1,924	1,859	2,019	2,050	2,200	2,246	2,070	2,185	2,004	2,066	24,428
New Mexico	9,323	8,840	9,411	8,711	8,934	8,758	9,031	9,294	8,884	9,088	9,019	8,647	107,940
New York	150	145	158	155	159	157	147	151	150	147	147	135	1,801
North Dakota [8]	1,789	1,794	1,508	1,588	1,684	1,824	1,913	2,073	1,833	1,909	1,906	2,133	21,954
Ohio	433	400	425	414	411	420	400	446	417	409	411	374	4,960
Oklahoma	17,340	16,159	16,692	15,923	16,233	15,367	15,652	15,841	15,028	16,013	15,801	16,239	192,288
Pennsylvania	509	494	511	535	544	554	495	563	539	527	521	466	6,258
Texas	84,147	79,488	83,412	77,905	75,936	75,063	75,396	76,087	75,029	75,333	75,797	80,039	933,632
Utah [9]	3,420	3,168	3,385	3,178	3,144	3,160	2,945	2,935	2,890	2,569	3,355	3,450	37,599
West Virginia	167	161	194	199	193	206	185	208	211	204	207	183	2,318
Wyoming	11,023	10,189	10,505	9,892	10,836	11,070	11,864	12,070	11,873	12,356	11,826	12,017	135,521
Other States	36	46	66	43	61	49	70	71	82	132	169	197	[12] 1,022
Total: 1960	224,140	209,986	220,977	211,132	212,296	208,161	212,645	215,145	209,119	215,687	213,992	221,653	2,574,933
1959	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,574,590
Daily average, 1960	7,230	7,241	7,128	7,038	6,848	6,939	6,860	6,940	6,971	6,958	7,133	7,150	7,035
Pennsylvania grade (included above)	945	914	984	1,012	1,011	1,045	950	1,056	1,032	1,014	1,004	906	11,873

[1] Includes field condensate.
[2] Conservation Committee of California Oil Producers.
[3] Colorado Oil and Gas Conservation Commission.
[4] Kansas Geological Survey.
[5] Louisiana Conservation Commission.
[6] Michigan Department of Conservation.
[7] Montana Oil Conservation Board.
[8] North Dakota Geological Survey.
[9] Utah Oil and Gas Conservation Commission.
[10] Includes Alaska (187), Arizona (25), Missouri (75), Nevada (32), South Dakota (151), Tennessee (6), Virginia (6), and Washington (1).
[11] Preliminary figures.
[12] Alaska (558), Arizona (73), Missouri (72), Nevada (25), South Dakota (281), Tennessee (6), Virginia (6), and Washington (1).

TABLE 11.—Percentage of total crude petroleum produced in the United States, by States

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960 [1]
Texas	45.0	44.6	43.2	42.1	42.4	42.3	41.0	38.4	37.8	36.3
Louisiana	10.3	10.7	10.9	10.6	10.9	11.4	12.6	12.8	14.1	15.3
California	15.8	15.7	15.5	15.4	14.3	13.4	13.0	12.8	12.0	11.8
Oklahoma	8.3	8.3	8.6	8.0	8.2	8.2	8.2	8.2	7.7	7.5
Wyoming	3.1	3.0	3.5	4.0	4.0	4.0	4.2	4.7	4.9	5.3
Kansas	5.1	5.0	4.9	5.2	4.9	4.7	4.7	4.9	4.6	4.4
New Mexico	2.3	2.6	3.0	3.2	3.3	3.4	3.6	4.0	4.1	4.2
Illinois	2.7	2.6	2.5	2.9	3.3	3.1	2.9	3.3	3.0	3.1
Mississippi	1.7	1.6	1.5	1.5	1.5	1.6	1.5	1.6	1.9	2.0
Colorado	1.2	1.3	1.5	2.0	2.1	2.2	2.1	2.0	1.8	1.8
Montana	.4	.4	.5	.6	.6	.8	1.0	1.1	1.2	1.2
Arkansas	1.3	1.3	1.3	1.3	1.1	1.1	1.2	1.2	1.0	1.1
Kentucky	.5	.5	.5	.6	.6	.7	.7	.7	1.1	.8
Michigan	.6	.6	.5	.5	.5	.4	.4	.4	.4	.6
Other States	1.7	1.8	2.1	2.1	2.3	2.7	2.9	3.9	4.4	4.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Preliminary figures.

TABLE 12.—Production of crude petroleum in leading fields in the United States, and total production since discovery [1]

(Thousand barrels)

Field	State	1959	1960	Total since discovery [2]
East Texas	Texas	52,992	43,124	3,453,903
Wilmington	California	26,974	27,570	883,953
Sho-Vel-Tum	Oklahoma	25,175	24,227	548,995
Elk Basin	Montana, Wyoming	21,438	20,665	174,517
Coalings, all fields	California	21,517	20,439	842,752
Rangely	Colorado	17,980	17,135	299,972
Ventura	California	18,876	17,121	639,951
Caillou Island	Louisiana	15,062	16,694	159,722
Huntington Beach	California	18,212	16,620	666,737
South Pass, Block 24	Louisiana	16,423	16,528	101,344
Burbank	Oklahoma	14,463	15,676	378,555
Ward-Estes, North	Texas	14,616	15,032	114,562
Kelly-Snyder	do	20,056	14,929	256,436
Midway Sunset	California	13,157	13,982	883,367
Cowden, all fields	Texas	14,086	13,820	330,322
Loudon	Illinois	12,586	12,628	248,043
Cuyama, South	California	12,590	12,265	139,309
Wasson—66 and 72	Texas	12,692	11,711	354,630
Timbalier Bay	Louisiana	10,220	11,695	56,567
San Ardo	California	11,010	11,534	102,213
Spraberry Trend	Texas	12,086	11,502	141,803
Golden Trend	Oklahoma	10,627	11,071	205,967
Seeligson (all zones)	Texas	14,918	10,918	195,187
Lake Washington	Louisiana	10,902	10,863	63,202
Bay Marchand, Block 2	do	6,093	9,858	42,156
Buena Vista	California	9,769	9,762	489,964
McElmo Creek	Utah	9,191	9,656	21,733
Goldsmith	Texas	20,164	9,452	298,400
TXL	do	6,759	9,243	157,796
Hawkins	do	9,845	9,173	260,874
Kern Front and Kern River	California	8,384	9,064	454,065
McElroy	Texas	9,810	8,928	186,410
Slaughter	do	9,062	8,553	268,990
Salem	Illinois	6,926	8,482	280,085
Weeks Island	Louisiana	7,476	8,422	99,743
Aneth	Utah	10,200	8,185	28,531
Hastings	Texas	9,290	7,786	311,416
Eunice-Monument	New Mexico	7,896	7,632	276,128
Adena & South Adena	Colorado	6,463	7,567	40,871
Hamilton Dome	Wyoming	6,793	7,482	70,454
Clay City	Illinois	7,269	7,470	219,339
West Delta, Block 30	Louisiana	6,314	7,444	22,476
Ratherford	Utah	7,571	7,334	18,572
Bridgeport (Old)	Illinois	6,264	7,174	284,450
South Mountain	California	7,375	6,682	87,132
Tom O'Conner	Texas	6,460	6,532	252,285

See footnotes at end of table.

TABLE 12.—Production of crude petroleum in leading fields in the United States, and total production since discovery [1]—Continued

(Thousand barrels)

Field	State	1959	1960	Total since discovery [2]
Citronelle	Alabama	4,426	6,464	21,416
Diamond M	Texas	7,627	6,451	97,983
Howard Glasscock	do	6,499	6,312	212,560
Denton	New Mexico	7,141	6,293	76,122
Bradford-Allegheny [3]	Pennsylvania, New York	6,237	6,287	695,244
Beaver Lodge-Tioga	North Dakota	7,048	6,265	52,907
Kermit	Texas	5,271	6,143	71,005
Caddo	Louisiana	6,334	6,118	257,607
Fullerton (& North & South)	Texas	6,493	6,060	142,791
Gladiola	New Mexico	7,046	6,031	26,301
Brea-Olinda	California	5,865	5,950	276,119
Baxterville	Mississippi	5,801	5,901	77,826
Levelland	Texas	6,346	5,879	118,962
Block 31	do	5,809	5,821	60,087
Webster	do	6,859	5,802	251,565
Emma (& Triple N)	do	5,961	5,750	41,155
Coles Levee, North & South	California	5,626	5,673	128,680
Little Creek	Mississippi	5,460	5,669	12,554
Long Beach	California	5,869	5,609	823,536
Caprock and East	New Mexico	6,581	5,525	44,415
Yates	Texas	6,372	5,475	467,768
Delhi	Louisiana	5,433	5,422	110,550
Keystone	Texas	5,963	5,368	169,915
West Bay	Louisiana	4,957	5,282	50,443
Garland & South	Wyoming	5,325	5,256	54,469
New Harmony	Illinois	4,758	5,252	105,174
Lake Barre	Louisiana	4,458	5,231	38,516
White Mesa	Utah	6,390	5,219	14,380
Thompson, all fields	Texas	5,673	5,188	240,828
Oregon Basin and West	Wyoming	5,557	5,187	97,745
Pine Unit Area	Montana	4,852	5,171	26,167
Conroe	Texas	6,017	5,162	387,994
Cogdell (all fields)	do	6,047	5,103	69,786
Agua Dulce-Stratton	do	5,222	5,039	156,862
Headlee	do	3,469	5,003	25,223

[1] Fields under 5 million barrels not shown for current year.
[2] Includes revisions.
[3] Bureau of Mines data.

Source: Oil and Gas Journal.

TABLE 13.—Production of crude petroleum in Arkansas, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Atlanta	438	399	228	148	290
Bradley West	499				
Buckner	444	415	363	332	309
Dorcheat-Macedonia	632	721	303	314	617
El Dorado	923	990	826	646	456
Fouke	1,431	1,468	1,279	855	1,088
Horsehead	403	188			
Magnolia	3,609	4,521	4,058	4,439	5,032
McKamie	1,349	1,337	976	755	950
Midway	2,238	2,299	2,046	2,196	2,211
Schuler	2,353	2,119	1,791	1,849	1,510
Smackover	4,466	4,206	4,114	4,363	4,057
Stephens	1,157	1,745	1,681	1,472	1,182
Village	811	776	721	398	626
Wesson	1,591	2,491	2,239	1,525	1,717
Other fields [2]	7,011	7,372	8,075	7,037	8,908
Total Arkansas	29,355	31,047	28,700	26,329	28,953

[1] Preliminary figures.
[2] Includes oil consumed on leases and net change in stocks held on leases for entire State.

TABLE 14.—Production of crude petroleum in California, by districts and fields

(Thousand barrels)

District and field	1956	1957	1958	1959	1960[1]
San Joaquin Valley:					
Belridge	4,297	4,677	4,782	4,620	5,035
Buena Vista	7,767	7,457	6,901	9,815	9,728
Coalinga	29,280	27,746	26,740	21,225	21,045
Coles Levee	5,313	5,888	5,443	4,824	5,659
Cuyama-Russell Ranch	15,940	16,215	15,084	14,544	14,233
Edison	4,568	4,135	3,808	3,527	3,033
Elk Hill	5,959	5,662	5,361	5,126	4,368
Fresno Group	---	---	---	3,033	106
Fruitvale	3,212	2,994	2,721	2,500	2,426
Gosford, East	443	---	---	---	---
Greeley	4,271	3,502	2,981	2,665	2,460
Helm	1,009	981	829	883	1,272
Kern River-Kern Bluff-Kern Front	7,437	7,665	6,888	8,648	9,460
Kettleman North Dome	5,252	4,898	4,786	3,926	3,460
Lost Hills	1,782	1,706	1,324	1,272	1,499
McKittrick	8,984	7,807	7,018	6,512	7,287
Midway-Sunset	15,070	15,206	13,107	13,126	13,959
Mountain View	1,447	1,608	1,523	1,403	1,587
Mount Poso	2,927	3,319	3,392	3,173	2,854
Poso Creek	1,517	1,655	1,342	1,349	1,354
Raisin City	2,137	1,951	1,793	1,668	1,457
Rio Bravo	3,995	4,262	3,629	3,464	3,260
Riverdale	544	540	487	391	328
Round Mountain	1,630	1,590	1,497	1,467	1,408
Tejon Group	3,360	2,331	2,722	5,030	5,105
Ten Section	1,638	1,577	1,506	1,614	1,469
Vallecitos Group	---	---	---	857	562
Wheeler Ridge	---	---	---	1,849	2,186
Other San Joaquin Valley	11,702	10,421	6,587	9,851	11,409
Total San Joaquin Valley	151,481	145,793	132,251	138,362	138,009
Coastal district:					
Aliso Canyon	2,606	2,343	2,027	1,876	1,723
Cat Canyon	6,133	4,481	4,197	4,454	3,361
Del Valle	747	1,140	961	423	818
Elwood	1,205	1,050	931	721	618
Gato Ridge	966	890	756	685	691
Lompoc	1,047	886	153	371	883
Newall-Portrero	3,459	3,199	2,871	2,656	2,239
Orcutt	1,144	1,099	1,046	976	925
Padre Canyon[2]	1,346	---	---	---	258
Placerita	1,590	1,458	1,333	1,126	983
Rincon	3,079	3,204	3,527	3,903	3,991
Romona	612	---	---	---	---
San Ardo	11,733	11,845	10,864	10,994	11,519
San Miguelito	1,648	2,346	2,102	1,341	1,166
Santa Maria	2,713	2,544	2,198	1,968	1,939
South Mountain	4,995	6,561	6,980	7,384	6,709
Ventura	24,357	21,159	20,451	18,872	17,065
Zaca Creek	953	780	668	633	585
Other Coastal	12,500	20,188	20,021	19,766	18,754
Total Coastal	82,833	85,173	81,086	78,149	74,227
Los Angeles Basin:					
Brea Olinda	6,864	6,850	6,362	5,904	5,884
Coyote	4,498	4,471	3,942	2,333	4,302
Dominguez	4,366	3,992	3,710	3,417	3,572
Huntington Beach	22,468	21,452	19,447	18,110	16,761
Inglewood	4,466	4,642	4,419	4,280	4,545
Long Beach	7,748	6,761	6,167	5,841	5,615
Montebello	1,518	1,450	1,360	1,331	1,265
Newport	1,546	1,507	1,467	2,230	1,248
Richfield	2,290	2,112	2,133	2,073	1,985
Rosecrans[3]	1,185	1,119	971	996	988
Sansinena	3,798	3,646	2,604	2,219	2,430
Sante Fe Springs	5,193	4,444	3,890	3,334	2,887
Seal Beach	3,946	4,037	3,881	3,401	3,249
Torrance	2,614	2,715	3,084	2,615	2,261
Wilmington	36,844	32,306	31,417	26,993	27,494
Other Los Angeles Basin	7,096	7,176	5,481	7,358	7,634
Total Los Angeles Basin	116,440	108,680	100,335	92,435	92,120
Total California	350,754	339,646	313,672	308,946	304,356

[1] Preliminary figures. [2] Includes Oak Grove area. [3] Includes Athens.

Source: Conservation Committee of California oil producers.

TABLE 15.—Production of crude petroleum in Colorado, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Adena	5,709	5,518	4,965	6,463	7,567
Badger Creek-West	518	498	383		570
Big Beaver	876	896	1,062	1,014	990
Black Hollow	676	656	549	538	470
Bobcat	884	625	670	535	389
Cliff	979	565	553	557	484
Divide	405				
Graylin-South and Northwest	1,051	690	631	524	432
Lewis Creek	456				
Little Beaver Creek					1,601
Little Beaver-East	1,993	2,282	1,754	1,666	914
Mt. Hope-East and North	840	566	430	689	
Plum Bush Creek	1,232	1,062	1,138	790	1,021
Rangely	28,302	26,154	20,914	17,980	17,135
Sand River	483				
Wilson Creek	2,556	2,528	2,396	2,709	2,800
Yenter	647	621	658	509	394
Other [2]	10,909	12,321	12,633	12,466	12,398
Total Colorado	58,516	54,982	48,736	46,440	47,165

[1] Preliminary figures.
[2] Includes crude oil consumed on leases and net change in stocks held on leases for entire State.

Source: Oil and Gas Journal.

TABLE 16.—Production of crude petroleum in Illinois, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Albion	1,120	1,313	1,377	1,113	888
Benton	1,032	807	606	529	467
Boyd	899	952	668	485	382
Bridgeport	4,352	4,174	5,280	6,264	7,174
Centralia	546	2,076	3,480	2,160	1,420
Clay City	9,210	8,187	7,972	7,269	7,470
Dale	3,543	2,441	2,485	1,979	2,506
East Inman	1,513	1,415	1,537	1,126	746
Johnsonville	1,063	1,010	992	1,698	1,438
Loudon	9,828	11,691	13,158	12,586	12,628
New Harmony	4,022	3,462	4,430	4,758	5,252
Phillipstown	1,168	547	691	606	653
Robinson	2,621	2,752	2,755	3,197	3,624
Roland	2,503	2,449	2,155	1,860	1,545
Sailor Springs	1,794	1,552	1,531	1,378	1,382
Salem	6,606	5,644	6,475	6,926	8,482
Other fields [2]	30,526	26,611	24,683	22,793	22,783
Total Illinois	82,346	77,083	80,275	76,727	78,840

[1] Preliminary figures.
[2] Bureau of Mines figures.

Source: Oil and Gas Journal.

TABLE 17.—Pipeline runs of crude petroleum in Kansas, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960
Bemis-Shutts	3,055	5,922	5,063	4,868	4,472
Bloomer	1,024	954	789	723	679
Browning	400	1,126	1,031	768	400
Burnett	2,074	(1)	(1)	(1)	(1)
Chase-Silica	3,482	4,271	3,260	3,689	3,219
Cooper	1,513	1,416	1,317	1,109	951
El Dorado	4,359	4,619	4,371	4,443	4,291
Fairport	980	1,061	1,065	1,040	991
Garfield	1,836	1,742	1,092	649	464
Genesco-Edwards	2,784	2,236	1,812	1,680	1,565
Gladys	1,810	1,859	1,638	1,202	763
Gorham	1,515	1,501	1,499	1,421	1,311
Hall-Gurney	3,598	3,543	3,296	3,253	3,229
Iuka-Carmi	1,472	1,219	1,035	855	702
Kraft-Prusa	3,712	3,437	3,092	2,890	2,526
Marcotte	1,887	2,020	1,779	1,596	1,424
Morel	1,482	1,617	1,477	1,354	1,299
Ray	1,225	1,314	1,353	1,363	1,289
Rhodes	947	1,074	664	403	305
Ritz-Canton	1,470	1,563	1,542	1,321	1,199
Seeley-Wick	1,307	978	719	583	[2] 1,097
Silica South	1,003	(3)	(3)	(3)	(3)
Spivey-Grabs [4]	1,758	2,031	1,961	2,370	2,492
Trapp	4,241	3,728	3,366	3,120	2,752
Trico [5]	935	1,239	1,253	1,117	991
Unger	147	1,126	1,189	1,008	772
Welch-Bornholdt	1,106	1,240	1,216	932	878
Other fields	73,345	71,218	73,063	75,746	73,283
Total Kansas	124,467	124,054	119,942	119,503	113,344
Change in field stocks [6]				+40	+111
Total Kansas production [6]	124,204	123,614	119,942	119,543	[7] 113,455

[1] Combined with Bemis-Shutts in 1957.
[2] Includes Hamilton in 1960.
[3] Combined with Chase-Silica in 1957.
[4] Formed by combination of Spivey field and Grabs field in 1956.
[5] Formed in 1956 by combination of Allphin Northwest, Annon, Annon South, Basset, Laura Southeast Marcotte South, Noah, Spaulding, White Southwest.
[6] Bureau of Mines.
[7] Preliminary figure.

Source: Kansas Geological Survey.

TABLE 18.—Production of crude petroleum in Louisiana, by districts and fields

(Thousand barrels)

District and field	1956	1957	1958	1959	1960 [1]
Gulf Coast:					
Anse la Butte	1,890	2,065	1,656	1,775	1,687
Avery Island	3,303	3,240	2,580	2,712	3,089
Bateman Lake	1,718	2,120	2,191	2,836	2,694
Barataria	1,103	1,023	800	761	864
Bay de Chene	1,609	1,794	1,600	1,913	2,199
Bay Marchand	3,539	3,791	4,684	6,390	10,264
Bay St. Elaine	3,188	3,376	3,338	3,764	4,355
Bayou Blue	931	1,133	913	743	772
Bayou Choctaw	1,176	1,204	1,131	1,361	1,434
Bayou Mallet	1,043	823	829	981	812
Bayou Sale	2,825	2,712	2,297	3,138	3,948
Bully Camp	1,623	1,582	1,236	1,452	1,321
Caillou Island	9,626	11,298	11,260	14,751	17,040
Charenton	1,426	1,391	1,228	1,573	1,407
Cox Bay	2,762	2,303	1,565	1,348	1,391
Delta Farms	4,493	4,010	3,285	3,656	3,391
Dog Lake	947	887	755	770	738
Duck Lake	2,916	2,477	2,282	2,483	2,709
East White Lake	1,390	1,463	1,111	1,044	1,672
Egan	2,529	2,263	1,839	1,773	1,785
Erath	919	1,310	1,365	1,201	1,208
Garden Island	1,340	1,429	1,373	1,672	2,116

See footnotes at end of table.

TABLE 18.—Production of crude petroleum in Louisiana, by districts and fields—Continued

(Thousand barrels)

District and field	1956	1957	1958	1959	1960 [1]
Gulf Coast—Continued					
Gibson	919	910	809	853	913
Golden Meadow	3,452	3,032	2,649	2,506	2,355
Good Hope	1,687	1,058	859	855	983
Grand Bay	4,030	4,113	3,178	3,084	4,067
Gueydan	963	961	800	923	1,119
Hackberry	5,927	6,903	5,914	5,706	5,251
Horseshoe Bayou	836	807	722	760	739
Iberia	800	814	785	841	886
Iowa	2,214	2,006	1,743	1,553	1,383
Jeanerette	1,148	1,271	1,147	1,219	1,170
Jennings	1,024	1,247	1,301	1,439	1,518
Lafitte	2,935	3,058	2,670	3,176	3,419
Lake Arthur South	1,097	1,024	1,077	1,531	1,510
Lake Barre	1,723	2,066	2,577	4,336	5,340
Lake Chicot	1,009	954	721	783	730
Lake Fausse Point	1,499	1,750	1,499	1,651	1,577
Lake Pelto	2,652	2,951	3,102	4,086	4,571
Lake Salvador	1,391	1,641	1,635	2,067	2,310
Lake Washington	7,849	11,089	9,682	11,098	11,329
La Rose	1,095	1,009	1,021	1,133	975
Leeville	4,094	4,033	3,711	3,829	3,826
Little Lake	2,353	2,453	2,096	2,509	2,274
Lockport	908	920	768	795	780
Main Pass	8,417	11,064	9,672	9,581	11,110
North Crowley	1,168	1,107	924	1,008	838
Paradis	2,843	2,625	2,286	2,479	2,732
Phoenix Lake	1,367	1,228	1,042	1,231	1,520
Pine Prairie	927	826	692	577	482
Point-a-la Hache	1,999	1,884	915	----------	----------
Port Barre	852	763	680	781	877
Quarantine Bay	3,964	3,536	2,765	2,953	3,227
Romere Pass	3,485	3,488	2,638	2,807	2,736
St. Gabriel	825	731	597	529	585
Section 28	1,396	1,336	1,101	1,093	1,014
Shuteston	1,025	905	979	902	701
South Pass	8,208	9,301	10,359	7,168	11,120
Tepetate	1,706	1,580	1,418	1,442	1,499
Timbalier Bay	6,120	8,600	8,562	10,202	11,996
University	934	822	508	446	435
Valentine	1,802	1,688	2,302	2,981	3,502
Venice	5,117	5,514	4,317	4,411	4,567
Ville Platte	1,150	996	794	805	810
Vinton	2,203	2,061	1,756	1,777	1,856
Weeks Island	8,668	8,602	6,871	7,318	8,397
West Bay	3,326	4,016	3,705	4,275	5,182
West Cote Blanche	1,891	2,022	2,989	2,967	4,375
West Delta, Block 30	----------	----------	----------	5,960	6,799
West Lake Verret	1,361	1,333	1,259	1,245	1,263
White Castle	786	966	842	887	965
Other Gulf Coast	77,653	97,011	102,601	126,433	133,258
Total Gulf Coast	252,494	283,769	272,358	317,082	347,767
Northern:					
Big Creek	679	587	476	483	428
Caddo	8,417	7,305	7,066	6,880	6,050
Cotton Valley	1,407	945	771	823	776
Delhi	6,301	6,411	4,931	5,086	5,144
Esperance Point	1,684	1,621	1,415	1,337	1,248
Haynesville	2,859	2,695	3,213	3,003	2,781
Lake St. John	2,430	2,258	2,072	1,845	1,569
Nebo [2]	1,905	1,746	1,468	1,523	1,513
Olla [3]	1,626	1,432	1,432	1,583	1,615
Rodessa	751	710	597	683	588
Sligo	1,043	1,340	1,277	1,405	1,388
Urania	786	765	766	812	837
Other Northern	17,039	18,312	16,049	20,121	22,656
Total Northern	46,927	46,127	41,533	45,584	46,593
Total Louisiana	299,421	329,896	313,891	362,666	[4] 394,360

[1] Preliminary figures.
[2] Includes Hemphill, Trout Creek, and Jena.
[3] Includes Little Creek and Summerville.
[4] Louisiana Conservation Department.

TABLE 19.—Production of crude petroleum in Michigan, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Beaver Creek	291	242	227	340	225
Coldwater	923	800	698	619	585
Deep River	875	576	286	225	190
East Norwich	402	361	332	294	276
Kawkawlin	434	595	583	496	446
Kimball Lake	57	42	22	16	11
Pentwater	197	165	135	117	80
Reed City and East Reed City	443	480	592	560	408
Rose City	392	302	292	338	298
St. Helen	209	174	142	155	148
Stony Lake	347	247	136	160	145
Other fields	6,170	6,185	5,863	7,119	12,853
Total Michigan	10,740	10,169	9,308	10,439	15,665

[1] Preliminary figures.
Source: Michigan Department of Conservation.

TABLE 20.—Production of crude petroleum in Mississippi, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Baxterville	5,874	4,939	4,993	5,843	5,877
Belton	842	1,148	1,248	1,380	1,436
Brookhaven	3,019	2,541	2,218	1,920	1,758
Bryan				1,222	1,888
Cranfield	1,299	1,206	982	840	733
Diamond			959	1,040	1,154
Eucutta	1,484	1,318	1,611	1,559	1,386
Heidelberg	3,641	3,395	2,916	3,672	3,351
La Grange and South	2,137	1,936	1,649	1,714	1,453
Little Creek			1,440	5,896	5,774
Mallalieu	1,021	841	739	744	593
Maxie-Pistol Ridge	998	1,277	1,185	1,207	1,000
Raleigh				2,168	2,157
Soso	4,289	4,241	4,174	4,651	3,901
Tinsley	4,399	3,884	3,830	3,532	3,347
Yellow Creek	1,494	1,323	1,054	1,020	1,170
Other fields	10,327	10,873	10,514	11,212	14,841
Total Mississippi	40,824	38,922	39,512	49,620	51,819

[1] Preliminary figures.

TABLE 21.—Production of crude petroleum in Montana, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Big Wall	255	248	218	204	264
Bowes	340	299	282	333	280
Cabin Creek	1,633	3,666	4,255	4,350	4,470
Cat Creek	162	163	170	151	181
Cut Bank	2,684	2,515	2,210	2,004	2,078
Elk Basin	2,007	2,603	3,143	4,065	2,718
Glendive	678	714	732	505	456
Kevin-Sunburst	1,017	953	969	833	744
Pine	3,667	5,326	5,346	4,832	5,112
Pondera	684	595	563	521	505
Poplar	4,098	4,894	4,641	3,775	3,232
Reagan	220	213	166	175	190
Sumatra	1,459	1,306	1,600	2,013	2,145
Other fields	2,856	3,677	3,662	6,096	7,865
Total Montana	21,760	27,172	27,957	29,857	30,240

[1] Preliminary figures.
Source: Montana Oil Conservation Board.

TABLE 22.—Production of crude petroleum in New Mexico, by districts and fields

(Thousand barrels)

District and field	1956	1957	1958	1959	1960 [1]
Southeast:					
Bagley	1, 614	1, 471	1, 312	1, 188	1, 156
Brunson	1, 193	870	627	519	----------
Caprock-East	6, 942	6, 362	5, 216	6, 581	5, 525
Crossroad	1, 358	1, 307	1, 402	1, 426	1, 480
Denton	10, 778	9, 391	7, 968	7, 141	6, 293
Dollarhide-West	3, 027	2, 761	2, 510	1, 855	1, 607
Drinkard	2, 054	1, 850	1, 738	1, 597	1, 465
Eunice-Monument	10, 527	12, 817	11, 674	7, 896	7, 632
Fowler	847	922	787	711	712
Gladiola	1, 605	4, 529	7, 324	7, 046	6, 031
Grayburg-Jackson	945	845	1, 318	1, 554	1, 707
Hare	973	829	583	634	522
Hobbs	3, 401	3, 495	3, 248	3, 399	3, 357
Langlie-Mattix	2, 046	1, 989	1, 996	2, 289	2, 955
Lovington-East	3, 080	2, 790	2, 466	2, 337	2, 137
Maljamar	2, 277	2, 227	2, 449	2, 730	2, 820
Moore	1, 235	1, 187	1, 042	1, 014	954
Saunders-South	1, 727	1, 534	1, 781	2, 476	2, 306
Vacuum	3, 944	3, 724	3, 348	3, 709	4, 061
Warren	1, 473	1, 007	1, 604	1, 194	1, 095
Other fields [2]	25, 433	30, 333	29, 571	36, 151	37, 719
Northwest	1, 414	2, 519	8, 551	12, 245	16, 406
Total New Mexico	87, 893	94, 759	98, 515	105, 692	107, 940

[1] Preliminary figures.
[2] Bureau of Mines figures.

Source: Oil and Gas Journal.

TABLE 23.—Production of crude petroleum in Oklahoma, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Allen	1, 638	1, 608	1, 590	1, 676	1, 525
Beebe	745	707	625	606	697
Bradley	3, 169	3, 053	2, 741	2, 898	2, 631
Burbank	13, 519	14, 280	14, 548	14, 463	15, 676
Cache Creek	661	721	827	910	1, 041
Cement	4, 372	4, 061	4, 405	4, 222	3, 836
Cumberland	1, 944	1, 812	1, 474	1, 407	1, 219
Cushing	2, 549	2, 650	2, 702	2, 585	2, 515
Davenport	1, 338	1, 289	959	855	613
Dilworth	921	677	517	453	----------
Doyle	3, 056	2, 798	2, 421	2, 241	1, 798
Elk City	5, 326	4, 078	2, 806	2, 113	1, 741
Eola	3, 566	3, 886	3, 188	3, 863	3, 470
Fitts	785	723	800	910	950
Garber	862	849	826	876	761
Glennpool	1, 901	2, 259	2, 773	3, 164	3, 200
Golden Trend	20, 204	17, 245	13, 106	10, 627	11, 071
Healdton	2, 347	2, 260	2, 331	2, 256	2, 154
Hewitt	3, 495	3, 240	3, 874	2, 977	2, 938
Holdenville-East	1, 117	628	476	412	----------
Hoover-Northwest	2, 063	1, 863	2, 417	2, 039	1, 329
Knox	1, 291	1, 232	1, 045	941	2, 206
Loco	1, 606	1, 542	1, 372	1, 290	1, 309
Lucien	951	817	743	749	710
Moore-West	----------	3, 250	2, 553	1, 527	1, 275
Naval Reserve	1, 102	1, 409	1, 498	1, 667	2, 353
Oklahoma City	3, 743	3, 482	3, 290	3, 050	2, 851
Olympic	1, 752	1, 573	1, 341	1, 101	967
Payson-East	786	467	(2)	423	893
Ringwood	484	(2)	(2)	(2)	----------

See footnotes at end of table.

TABLE 23.—Production of crude petroleum in Oklahoma, by fields—Continued

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Seminole:					
Bowlegs	685	655	619	665	905
Little River	571	478	430	390	388
St. Louis	1,486	1,443	1,410	1,379	1,422
Seminole	827	912	876	797	696
Sho-Vel-Tum	29,717	29,008	25,823	25,175	24,227
West Edmond	1,945	1,292	1,153	1,013	1,407
Witcher	378	(2)	(2)	(2)	----------
Yale-Quay	1,322	1,765	1,927	1,700	1,254
Other fields [3]	91,638	94,649	92,003	94,670	90,260
Total Oklahoma	215,862	214,661	200,699	198,090	192,288

[1] Preliminary figures.
[2] Included in "Other fields."
[3] Bureau of Mines figures.

Source: Oil and Gas Journal.

TABLE 24.—Production of crude petroleum in Texas, by districts and fields

(Thousand barrels)

District and field [1]	1956	1957	1958	1959	1960 [2]
Gulf Coast:					
Amelia	1,091	(3)	(3)	(3)	(3)
Anahuac	5,165	5,279	4,028	4,096	3,491
Barbers Hill	1,865	1,662	1,585	1,385	1,339
Beaumont-West	900	(3)	(3)	(3)	(3)
Bloomington	1,276	1,130	866	853	767
Boling	1,616	1,433	1,395	1,341	1,237
Chocolate Bayou	4,118	4,361	4,200	3,953	4,057
Conroe	10,455	9,492	6,979	6,958	6,001
Damon Mound	907	(3)	(3)	(3)	(3)
Dickenson-Gillock	3,946	3,571	3,222	2,967	3,077
Dyersdale	688	(3)	(3)	(3)	(3)
Esperson	1,023	1,005	1,037	976	909
Fairbanks	1,254	1,054	894	700	526
Falls City	854	(3)	(3)	(3)	(3)
Fannette	1,185	1,511	1,760	1,578	1,731
Francitas	1,540	1,272	846	815	641
Friendswood-Webster	10,515	9,511	6,760	6,865	5,801
Gohlke, Helen	2,081	1,715	1,244	1,246	1,041
Goose Creek	2,813	2,736	2,617	2,541	2,468
Greta	2,371	2,221	1,668	1,905	1,471
Hankamer	1,118	1,023	1,034	1,064	1,203
Hastings	11,396	10,304	7,919	9,318	7,741
Heyser	1,001	(3)	(3)	(3)	1,300
High Island	3,476	3,554	3,864	3,958	4,600
Houston-North-South	1,285	1,227	1,045	950	(3)
Hull	3,909	3,668	3,653	3,222	2,632
Humble	1,057	1,074	1,065	1,151	1,184
Liberty, South	3,324	4,100	5,657	4,565	3,560
Livingston	1,059	(3)	(3)	(3)	(3)
Lolita	1,459	1,378	1,407	1,703	1,505
Lovell Lake	870	(3)	(3)	751	416
McFadden	1,314	1,138	796	477	459
Manvel	1,649	1,469	1,069	1,099	1,055
Markham	1,598	1,819	1,957	1,701	1,356
O'Connor, Tom	----------	----------	----------	7,049	7,697
Old Ocean	5,287	5,674	4,707	4,471	3,709
Oyster Bayou	2,968	2,612	2,044	2,148	1,822
Pierce Junction	5,395	6,720	5,007	3,846	2,962
Placedo	1,716	1,371	1,057	910	791
Port Neches	1,260	1,002	921	881	937
Raccoon Bend	2,084	1,694	1,321	1,348	1,293

See footnotes at end of table.

TABLE 24.—Production of crude petroleum in Texas, by districts and fields—Con.

(Thousand barrels)

District and field [1]	1956	1957	1958	1959	1960 [2]
Gulf Coast—Continued					
Refugio-Fox	2,190	2,055	1,923	1,824	1,595
Saratoga	1,112	1,618	1,431	1,119	937
Silsbee	1,284	937	1,221	2,047	1,460
Sour Lake	1,408	1,319	1,194	1,151	1,039
Stowell	1,738	1,198	603	615	507
Sugarland	932	853	608	616	518
Sugar Valley	1,101	921	715	695	637
Thompson	8,990	8,193	6,000	5,979	5,186
Tomball	2,242	2,035	1,498	1,619	1,523
Village Mills	2,511	2,730	2,063	2,137	1,578
West Columbia	2,365	2,475	2,687	2,934	2,942
West Ranch	6,314	6,190	4,641	4,713	4,137
Withers-Magnet	3,241	3,162	2,458	2,230	1,629
Other Gulf Coast	81,254	77,995	68,720	66,530	63,810
Total Gulf Coast	225,570	209,461	179,386	183,000	168,277
East Texas:					
East Texas Proper	77,582	70,109	52,593	53,691	49,029
Cayuga	1,088	999	925	937	899
Ham Gossett	871	659	486	462	419
Hawkins	16,304	14,786	10,687	10,796	9,174
Long Lake	1,161	1,779	645	681	524
New Hope	2,172	2,162	1,993	1,933	1,533
Pewitt Ranch	1,073	927	700	661	581
Pickton	1,429	1,189	983	808	603
Quitman	2,176	2,192	2,117	2,478	2,909
Talco	4,896	4,523	3,977	4,280	4,109
Van	8,703	7,823	5,683	5,700	4,885
Waskom	1,191	872	889	902	709
Woodlawn	652	419	380	384	(3)
Other East Texas	21,954	21,919	24,242	22,690	26,497
Total East Texas	141,252	130,358	106,300	106,403	101,871
Central Texas:					
Big Foot	2,148	1,610	2,021	1,686	1,435
Charlotte	2,960	2,071	1,541	1,474	1,255
Darst Creek	3,415	3,450	3,465	3,331	3,674
Luling	2,699	2,598	2,444	1,832	1,568
Other Central Texas	9,225	8,727	6,916	7,062	9,338
Total Central Texas	20,447	18,456	16,387	15,385	17,270
South Texas:					
Aqua Dulce	1,428	1,479	1,171	1,038	947
Flour Bluff	829	872	750	(3)	(3)
Fulton Beach	2,579	4,340	2,415	2,051	2,265
Garcia	931	834	645	(3)	(3)
Hoffman	1,385	1,440	1,210	1,384	1,240
Kelsey	3,833	3,359	2,457	2,568	2,295
London	1,238	1,083	728	(3)	(3)
Midway	1,090	940	644	(3)	(3)
Mirando				3,335	4,763
Mustang Island	2,566	2,246	1,755	2,207	1,515
Plymouth	6,043	4,757	3,992	6,157	6,385
Portilla	3,144	2,936	2,228	(3)	(3)
Saxet-Saxet Frio	1,173	1,312	847	790	685
Seeligson				7,838	8,050
Stratton	2,345	1,999	1,500	1,746	1,143
Sun	1,843	1,673	1,439	1,644	1,941
Taft	1,251	929	744	899	1,929
White Point	3,444	3,426	2,417	2,275	2,109
Willamar, West	2,442	2,072	1,491	1,512	1,346
Other South Texas	52,930	47,002	43,057	35,615	32,533
Total South Texas	90,494	82,699	69,490	71,059	69,146
North Texas	138,696	132,457	120,176	120,307	117,302
Panhandle	36,682	38,481	38,587	36,750	38,570

See footnotes at end of table.

TABLE 24.—Production of crude petroleum in Texas, by districts and fields—Con.

(Thousand barrels)

District and field [1]	1956	1957	1958	1959	1960 [2]
West Texas:					
Abell	1,520	1,590	1,465	1,366	1,251
Adair	2,392	2,107	1,552	1,915	1,886
Andector	5,510	4,500	2,719	2,815	3,254
Anton Irish-Anton	2,933	2,600	2,000	2,068	1,789
Benedum	2,225	1,982	1,657	1,520	1,282
Big Lake	801	(3)	(3)	(3)	(3)
Block 31	5,727	5,690	5,695	5,786	5,787
Bronte	932	1,865	1,261	1,252	1,060
Cedar Lake	1,464	1,385	1,061	1,088	1,152
Cogdell	6,848	6,908	4,972	6,188	5,281
Cowden	10,769	9,764	9,178	10,460	10,480
Cree-Sykes	1,079	1,241	761	807	710
Diamond M	9,381	8,465	5,779	5,903	6,123
Dollarhide	4,959	4,139	3,227	3,218	3,018
Elkhorn	900	(3)	(3)	(3)	(3)
Embar	1,704	1,862	1,522	1,702	1,290
Emma	3,259	3,452	2,621	3,033	2,749
Fort Chadborne	3,802	3,788	3,806	3,369	2,745
Fort Stockton	1,525	1,272	976	1,084	994
Foster	4,816	4,282	3,388	3,049	2,874
Fuhrman	3,662	4,471	3,878	3,969	3,743
Fullerton	6,495	5,977	5,700	6,087	5,834
Garza	2,815	2,625	2,104	2,040	1,766
Goldsmith	18,385	20,434	20,827	23,890	22,253
Good	1,383	1,248	1,022	1,381	1,549
Harper	2,217	2,424	1,999	1,927	1,497
Headlee	-----	-----	-----	3,002	4,830
Hendrick	1,263	1,351	1,522	1,625	1,665
Howard-Glasscock	6,905	6,683	6,865	6,310	6,167
Hulldale Penn	2,104	1,763	1,278	1,340	1,255
Iatan-East and North	-----	-----	-----	1,834	1,788
Jameson	6,905	4,822	3,360	2,971	2,560
Jordan	3,316	3,378	3,007	2,934	2,648
Kelly Snyder	25,339	26,827	19,568	21,072	17,557
Kermit	3,704	4,841	4,510	5,231	5,413
Keystone	7,801	7,005	6,214	5,962	4,679
Lea	1,506	1,359	1,047	963	830
Levelland	8,714	7,892	6,584	6,427	5,842
Luther	1,246	1,073	900	910	834
McCamey	1,730	1,881	1,947	1,885	1,889
McElroy	9,562	10,751	9,220	9,249	8,882
McFarland	2,050	3,708	5,954	2,134	1,534
Mabee	1,024	1,093	1,112	1,636	1,533
Magutex	2,232	2,132	1,604	2,223	2,011
Martin	2,199	2,067	1,515	1,456	1,234
Means	6,421	6,495	5,058	4,803	4,046
Midland Farms	7,638	7,143	5,993	6,746	6,076
Pegasus	5,165	4,490	3,342	3,984	4,047
Penwell	1,719	2,049	2,245	2,679	3,018
Prentice	5,753	5,164	4,322	4,284	3,470
Reinecke	1,525	1,401	1,008	1,014	860
Robertson	1,344	1,652	2,143	3,033	3,179
Russell	7,200	6,874	5,137	5,206	4,903
Salt Creek	4,039	3,679	2,840	3,952	3,333
Sand Hills	6,800	6,729	5,334	5,294	4,788
Seminole	5,584	5,246	3,836	3,802	3,261
Shafter Lake	3,444	3,019	2,375	2,487	2,132
Sharon Ridge	1,590	1,966	2,500	3,857	3,146
Slaughter	11,010	10,180	8,237	8,712	8,188
Sprayberry Trend	24,010	19,835	15,021	12,738	10,162
Three Bar	1,189	1,036	758	858	657
Tippett	(3)	(3)	(3)	1,684	1,380
Todd	2,435	1,939	1,298	1,462	1,414
Triple N	1,492	1,342	1,406	1,626	1,332
TXL	5,602	5,502	4,449	4,425	3,870
University	3,704	4,122	3,419	3,682	3,602
Vealmoor-East	3,248	2,903	2,088	2,072	1,780
Waddell	1,572	2,635	2,903	2,526	2,669
Ward-Estes	9,964	14,245	17,561	19,544	21,186
Wasson	15,617	14,377	11,566	12,830	12,005
Welch	1,835	1,858	1,616	2,087	1,909
Wellman	1,057	(3)	(3)	(3)	(3)

See footnotes at end of table.

TABLE 24.—Production of crude petroleum in Texas, by districts and fields—Con.

(Thousand barrels)

District and field [1]	1956	1957	1958	1959	1960
West Texas—Continued					
Westbrook	1,209	1,869	1,577	1,597	1,418
Wilshire	2,174	1,949	1,405	1,390	1,320
World	1,903	1,814	1,734	1,800	1,702
Yarbrough	2,141	1,900	1,372	1,294	779
Yates	9,681	8,818	6,396	6,343	5,495
Other West Texas	101,499	117,027	115,524	126,182	130,551
Total West Texas	454,667	461,955	409,840	439,074	421,196
Total Texas	1,107,808	1,073,867	940,166	971,978	933,632

[1] Texas Railroad Commission districts.
[2] Preliminary figures.
[3] Included in "Other fields."

TABLE 25.—Production of crude petroleum in Wyoming, by fields

(Thousand barrels)

Field	1956	1957	1958	1959	1960 [1]
Beaver Creek	2,436	2,289	2,391	2,389	2,782
Big Muddy	2,120	1,915	1,781	2,260	2,223
Big Sand Draw	2,543	2,648	2,586	2,489	1,982
Bonanza	5,581	5,075	4,801	3,497	2,695
Byron-Garland	7,916	6,978	6,474	7,820	7,907
Cole Creek-Northeast and South	1,094	985	879	746	318
Elk Basin	11,200	12,716	15,518	18,214	18,803
Fiddler Creek	(2)	(2)	(2)	3,525	6,174
Frannie	3,055	2,695	2,647	2,812	2,718
Gebo	1,342	1,165	1,067	1,163	1,226
Glenrock-South	3,488	3,091	2,711	2,509	2,017
Grass Creek	4,308	4,000	3,899	4,619	4,543
Hamilton Dome	5,106	5,617	8,577	9,294	12,045
Hidden Dome	(2)	(2)	(2)	2,867	2,251
Lance Creek	1,489	1,539	1,338	1,222	1,188
Little Buffalo	1,187	1,250	2,105	2,250	2,039
Lost Soldier-Bairoil	6,506	6,513	6,407	6,135	5,989
Oregon Basin	5,817	5,168	4,719	5,183	5,234
Salt Creek	5,085	6,796	8,486	7,500	9,515
Steamboat Butte	3,419	3,493	3,259	(2)	(2)
Sussex-Meadow	7,602	6,728	5,564	6,955	6,387
Winkleman	1,777	2,644	3,044	3,353	3,114
Other fields	21,759	26,279	27,319	29,248	34,371
Total Wyoming	104,830	109,584	115,572	126,050	135,521

[1] Preliminary figures.
[2] Included in "other fields."

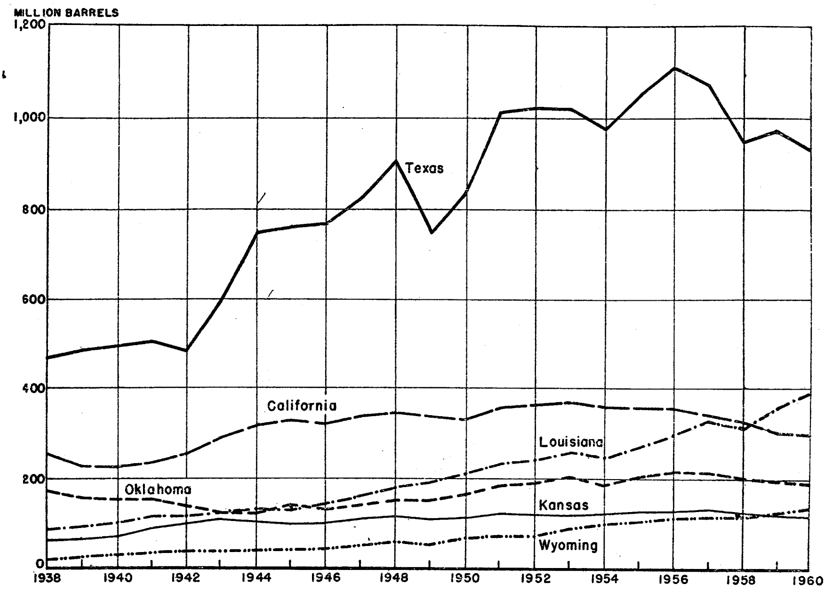

FIGURE 2.—Production of crude petroleum in the United States, 1938–60, by principal producing States.

WELLS

Drilling activity in the United States in 1960 was at its lowest ebb since 1951. The number of wells drilled, including oil, condensate, gas wells and dry holes, but excluding service wells, totaled 44,018. This represented a decline of 12.1 percent in the number of wells drilled for the year compared with 1959. The proportion of dry holes drilled to the total increased from 38.5 percent in 1959 to 39.9 percent in 1960.

States located along the east and west coast reported an increase in the number of wells drilled for the year, but 3,478 fewer wells were drilled in the Gulf coast area and 2,971 less, in the midcontinent area during 1960.

At the end of the year, a total of 591,158 oil wells were reported as producing an average of 12.0 barrels per day. On December 31, 1959, there were 583,141 producing oil wells with a daily average production of 12.2 barrels.

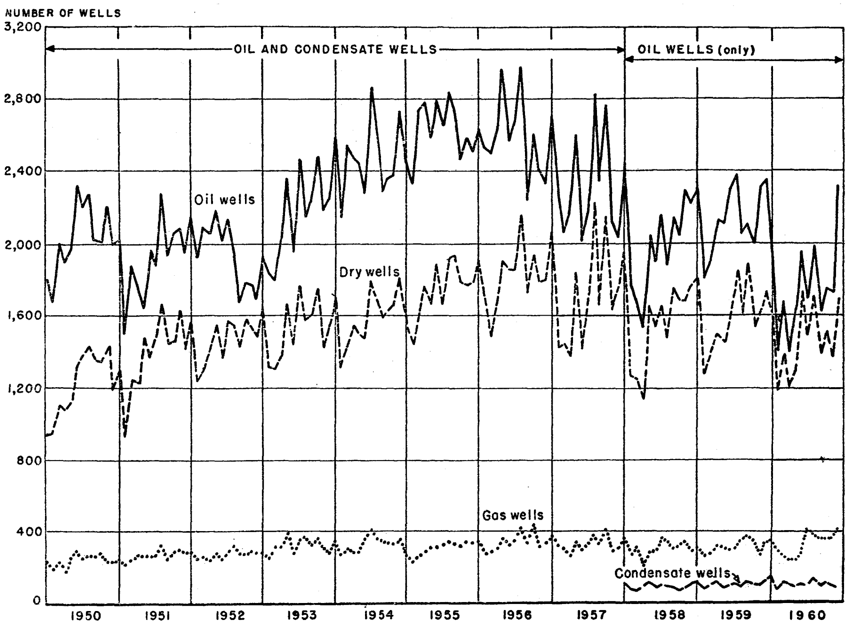

FIGURE 3.—Wells drilled for oil and gas in the United States, 1950–60, by months.

TABLE 26.—Wells drilled for oil and gas in the United States,[1] by months

Wells	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
													Number	Percent
1959:[2]														
Oil	2,334	1,807	1,937	2,122	2,102	2,308	2,375	2,055	2,108	1,999	2,316	2,337	25,800	51.5
Condensate	124	81	100	121	80	96	109	94	122	103	102	123	1,255	2.5
Gas	314	266	278	311	310	300	306	341	374	353	279	342	3,774	7.5
Dry	1,815	1,283	1,406	1,500	1,454	1,597	1,838	1,608	1,880	1,539	1,618	1,727	19,265	38.5
Total	4,587	3,437	3,721	4,054	3,946	4,301	4,628	4,098	4,484	3,994	4,315	4,529	50,094	100.0
1960:														
Oil	1,971	1,393	1,677	1,403	1,638	1,961	1,713	1,981	1,627	1,759	1,732	2,331	21,186	48.1
Condensate	161	71	118	99	95	114	100	127	107	116	103	95	1,306	3.0
Gas	347	293	263	240	242	272	406	387	361	363	362	416	3,952	9.0
Dry	1,610	1,191	1,372	1,203	1,283	1,727	1,507	1,713	1,406	1,498	1,377	1,687	17,574	39.9
Total	4,089	2,948	3,430	2,945	3,258	4,074	3,726	4,208	3,501	3,736	3,574	4,529	44,018	100.0

[1] Includes Alaska as follows, 1959: Oil, 5; condensate, 0; gas, 3; dry, 9. 1960: Oil, 12; condensate, 0; gas, 8; dry, 7.
[2] Revised.

Source: Oil and Gas Journal.

TABLE 27.—Wells drilled for oil and gas in the United States, by States and districts

State and district	1959[1]					1960				
	Oil	Condensate	Gas	Dry	Total	Oil	Condensate	Gas	Dry	Total
Alabama	70			25	95	38			7	45
Alaska	5		3	9	17	12		3	7	22
Arizona	2		1	24	27	3		1	31	35
Arkansas	462		41	334	837	292	2	36	279	609
California	884		73	512	1,469	1,160	1	114	419	1,694
Colorado	160	2	83	560	805	119	9	116	462	706
Florida				7	7				5	5
Georgia									1	1
Idaho									1	1
Illinois	1,009		9	1,062	2,080	776		8	1,055	1,839
Indiana	295		11	566	872	345		12	699	1,056
Iowa				1	1				4	4
Kansas	1,760	9	174	1,937	3,880	2,040	1	200	1,818	4,059
Kentucky	2,146		289	893	3,328	768		264	722	1,754
Louisiana:										
Gulf Coast	1,034	358	35	824	2,251	1,064	333	52	797	2,246
Northern	752	3	161	601	1,517	621	2	230	598	1,451
Total Louisiana	1,786	361	196	1,425	3,768	1,685	335	282	1,395	3,697
Maryland			1		1					
Michigan	241		54	308	603	357		26	428	811
Mississippi	251	30	2	362	645	308	30	9	347	694
Missouri	1			1	2	4			25	29
Montana	168		11	169	348	132		8	212	352
Nebraska	293		1	616	910	279		2	613	894
Nevada				2	2				3	3
New Mexico:										
West	410	43	334	112	899	197	32	351	96	676
East	829	9	25	302	1,165	817	14	23	305	1,159
Total New Mexico	1,239	52	359	414	2,064	1,014	46	374	401	1,835
New York	144		8	27	179	126		28	60	214
North Carolina				9	9				3	3
North Dakota	273	5		158	436	159	1		122	282
Ohio	484		297	274	1,055	454		260	304	1,018
Oklahoma	3,098	106	405	2,236	5,845	2,284	72	434	1,472	4,262
Oregon				2	2				11	11
Pennsylvania	160		327	67	554	256		269	91	616
South Dakota	13			10	23	7			15	22
Tennessee	5			53	58	10		2	80	92
Texas:										
Gulf Coast	682	270	133	903	1,988	633	264	170	850	1,917
West Texas	4,035	60	68	1,216	5,379	2,698	108	58	998	3,862
East Texas	715	87	11	429	1,242	718	92	6	485	1,301
Other districts	4,772	270	567	3,905	9,514	3,831	343	498	3,422	8,094
Total Texas	10,204	687	779	6,453	18,123	7,880	807	732	5,755	15,174
Utah	183		16	119	318	117		23	102	242
Virginia			10	1	11			8		8
Washington				4	4				5	5
West Virginia	93		550	124	767	78		686	94	858
Wyoming	371	3	74	501	949	483	2	55	526	1,066
Total United States	25,800	1,255	3,774	19,265	50,094	21,186	1,306	3,952	17,574	44,018

[1] Revised.

Source: Oil and Gas Journal.

TABLE 28.—Producing oil wells in the United States and average production per well per day, by States

State	Producing oil wells			
	1959		1960 [1]	
	Approximate number of producing oil wells, Dec. 31	Average production per well per day (barrels)[2]	Approximate number of producing oil wells, Dec. 31	Average production per well per day (barrels)[2]
Arkansas	6,155	12.2	6,381	12.6
California	36,915	23.1	37,771	22.3
Colorado	2,089	59.4	2,021	62.7
Illinois	31,826	6.6	31,995	6.8
Indiana	5,050	6.4	5,176	6.2
Kansas	40,175	8.4	40,460	7.7
Kentucky	21,165	3.7	20,571	2.8
Louisiana:				
Gulf Coast	11,110	79.2	12,232	81.4
Northern	12,358	10.2	12,450	10.3
Total Louisiana	23,468	42.7	24,682	44.8
Michigan	4,130	7.1	4,348	10.1
Mississippi	2,403	58.5	3,086	51.6
Montana	3,888	21.0	3,707	21.8
Nebraska	1,461	47.3	1,571	44.0
New Mexico:				
Southeastern	11,540	22.0	12,840	20.5
Northwestern	1,200	37.5	1,446	33.9
Total New Mexico	12,740	23.4	14,286	21.8
New York	19,230	.3	18,579	.3
North Dakota	1,390	38.5	1,451	42.2
Ohio	16,934	1.0	16,743	.8
Oklahoma	75,630	7.2	77,720	6.9
Pennsylvania	68,450	.2	66,260	.3
Texas: [3]				
Gulf Coast	18,818	23.2	18,881	24.4
East Texas proper	18,904	7.4	19,082	7.1
West Texas	60,730	19.9	62,459	18.7
Other districts	90,482	9.3	92,512	8.8
Total Texas	188,934	14.1	192,934	13.4
Utah	697	180.1	796	137.5
West Virginia	12,780	.5	12,560	.5
Wyoming	7,090	47.2	7,475	50.8
Other States	[4] 541	34.8	[5] 585	42.0
Total United States	583,141	12.2	591,158	12.0

[1] Preliminary figures.
[2] Based on the average number of wells during the year.
[3] Divisions of the Texas Railroad Commission.
[4] Alabama, 344 wells; Alaska, 5; Arizona, 2; Florida, 11; Missouri, 121; Nevada, 2; South Dakota, 14; Tennessee, 34; Virginia, 7; Washington, 1.
[5] Alabama, 380 wells; Alaska, 17; Arizona, 3; Florida, 11; Missouri, 120; Nevada, 2; South Dakota, 19; Tennessee, 27; Virginia, 5; Washington, 1.

TABLE 29.—Runs to stills of crude petroleum in the United States in 1960, by district and month [1]

(Thousand barrels)

District [2]	January	February	March	April	May	June	July	August	September	October	November	December	Total
East Coast:													
Domestic	15,925	13,160	13,341	13,254	12,757	12,852	14,745	14,051	13,412	13,792	13,780	15,153	166,222
Foreign	18,902	19,242	21,098	18,452	22,246	20,996	22,142	20,928	21,551	22,125	18,080	18,160	243,922
Total East Coast	34,827	32,402	34,439	31,706	35,003	33,848	36,887	34,979	34,963	35,917	31,860	33,313	410,144
Appalachian No. 1	3,198	2,853	3,090	3,005	3,013	2,880	2,836	2,906	2,830	2,326	2,934	3,280	35,151
Appalachian No. 2	3,364	3,081	3,174	2,689	2,275	2,688	3,348	3,365	3,215	3,336	3,046	3,099	36,680
Indiana, Illinois, Kentucky, etc.:													
Domestic	48,409	42,961	45,268	44,179	43,875	43,342	44,594	46,570	43,763	43,507	42,459	45,469	534,396
Foreign	246	223	242	234	258	301	302	270	440	515	415	616	4,062
Total Indiana, Illinois, Kentucky, etc	48,655	43,184	45,510	44,413	44,133	43,643	44,896	46,840	44,203	44,022	42,874	46,085	538,458
Minnesota, Wisconsin, North Dakota and South Dakota:													
Domestic	1,892	1,581	1,592	1,962	2,159	1,927	1,955	2,395	2,138	2,388	2,188	2,132	24,309
Foreign	1,978	1,809	1,989	1,531	1,569	1,912	1,992	1,680	1,361	1,266	1,258	1,835	20,180
Total Minnesota, Wisconsin, North Dakota, and South Dakota	3,870	3,390	3,581	3,493	3,728	3,839	3,947	4,075	3,499	3,654	3,446	3,967	44,489
Oklahoma, Kansas, etc	23,582	21,492	21,237	20,811	21,447	22,541	22,898	23,312	22,146	20,904	21,163	22,797	264,330
Texas Inland	9,354	8,465	8,857	8,482	9,023	9,119	9,582	9,556	8,876	8,567	8,233	8,822	106,936
Texas Gulf Coast:													
Domestic	59,643	55,078	57,624	56,365	58,397	58,896	61,117	58,347	55,410	57,786	56,344	58,226	693,233
Foreign	393	59	172	190	195	106	39	127	79	2	91	153	1,606
Total Texas Gulf Coast	60,036	55,137	57,796	56,555	58,592	59,002	61,156	58,474	55,489	57,788	56,435	58,379	694,839
Louisiana Gulf Coast:													
Domestic	21,418	19,089	19,985	19,835	21,066	19,587	20,803	21,040	19,381	20,869	19,323	19,474	241,870
Foreign	2	136	----------	108	24	6	36	20	----------	35	35	34	436
Total Louisiana Gulf Coast	21,420	19,225	19,985	19,943	21,090	19,593	20,839	21,060	19,381	20,904	19,358	19,508	242,306
Arkansas, Louisiana Inland, etc	3,184	3,171	3,103	3,192	3,392	3,359	3,307	3,391	3,237	3,404	3,250	3,413	39,403
New Mexico	740	714	772	683	752	735	813	791	647	432	670	741	8,490

Rocky Mountain:													
Domestic	9,215	8,754	8,696	7,940	7,564	8,237	9,767	9,707	8,820	8,815	8,386	8,516	104,417
Foreign	----------	1	----------	----------	2	3	3	3	2	1	2	3	20
Total Rocky Mountain	9,215	8,755	8,696	7,940	7,566	8,240	9,770	9,710	8,822	8,816	8,388	8,519	104,437
West Coast:													
Domestic	28,042	24,578	28,130	27,674	28,309	25,232	28,375	27,585	27,167	26,470	26,690	27,879	326,131
Foreign	7,172	7,433	7,053	8,223	8,524	9,054	8,868	9,704	8,524	8,617	8,442	9,126	100,740
Total West Coast	35,214	32,011	35,183	35,897	36,833	34,286	37,243	37,289	35,691	35,087	35,132	37,005	426,871
Total United States:													
Domestic	227,966	204,977	214,869	210,071	214,029	211,395	224,140	223,016	211,042	212,596	208,466	219,001	2,581,568
Foreign	28,693	28,903	30,554	28,738	32,818	32,378	33,382	32,732	31,957	32,561	28,323	29,927	370,966
Grand total: 1960	256,659	233,880	245,423	238,809	246,847	243,773	257,522	255,748	242,999	245,157	236,789	248,928	2,952,534
1959	255,124	227,562	254,422	235,982	244,789	239,607	244,316	250,508	236,326	237,066	239,517	252,442	2,917,661
Daily average, 1960	8,279	8,065	7,917	7,960	7,963	8,126	8,307	8,250	8,100	7,908	7,893	8,030	8,067

[1] Preliminary figures.

[2] Where no breakdown is shown, runs were all domestic crude.

CONSUMPTION AND DISTRIBUTION

The total demand for crude oil in the United States in 1960 was 8,097,900 barrels daily, an increase of 0.8 percent for the year. The demand for domestic crude oil increased 19,100 barrels per day and demand for foreign crude oil was 44,400 barrels per day above the 1959 level.

Foreign crude oil supplied 12.5 percent of crude oil requirements in 1960, compared with 12.1 percent in 1959.

Crude oil exports were slightly higher for the year, 2.5 million barrels in 1959 compared with 3.1 million in 1960.

Runs to Stills.—Crude runs to stills averaged 8,067,000 barrels daily in 1960, compared with 7,994,000 barrels daily in 1959. Domestic crude input averaged 7,053,000 barrels daily and foreign crude averaged 1,014,000 barrels daily for the year.

Distribution.—The Bureau of Mines collects data on receipts of domestic and foreign crude petroleum at refineries in the United States. These receipts include the crude runs to stills, a small quantity used as refinery fuel, and any increase in crude stocks at refineries. Classification of receipts, by State of origin, shows receipts from local production (intrastate), receipts from other States (interstate), and receipts of imported crude. Classification by method of transportation indicates the final receipts by water, pipeline, and tank car and truck. Receipts of domestic crude by water usually were moved by pipeline from the point of production to the point of water shipment.

Receipts of domestic and foreign crude petroleum at refineries totaled 2,951,000,000 barrels in 1960; foreign crude represented 12.6 percent of this total. The refineries processed 2,952,500,000 barrels and reported 1.4 million barrels used for refinery fuel and losses. The difference of 2.9 million barrels was withdrawn from stocks.

Refineries received 74.2 percent of their supply of crude oil by pipeline, 24.3 percent by water, and the remainder by tank cars and trucks.

The major waterborne shipments were from the gulf coast to the east coast and between States in the gulf coast districts. There are also interstate and intrastate shipments by water on the west coast and the Mississippi River.

All foreign crude receipts into the east coast and the gulf coast districts are received by water. Refineries in District II, which comprises the Great Lakes and the Midcontinent areas, receive most of their foreign crude by pipeline from Canada; however, some is barged with tanker up the river from gulf coast ports. Very little foreign crude is processed at refineries in the Rocky Mountain States; such crude as is used arrives at the refineries by rail from Canada. West coast refiners received 82.1 percent of their foreign crude supply by water, and the remainder is received by pipeline at refineries near the Canadian border.

Demand by States of Origin.—Distribution of domestic crude oil by refining States and districts can be analyzed from receipts of crude oil at refineries. When long distance shipments are involved, various crudes may be mixed in transit or storage, and identification by origin may be only approximate.

TABLE 30.—Receipts of domestic and foreign crude petroleum at refineries in the United States

(Million barrels)

Method of transportation	1956	1957	1958	1959	1960 [1]
By water:					
Intrastate	166.4	152.2	141.4	134.1	125.8
Interstate	220.6	253.7	233.7	242.7	261.6
Foreign	304.5	318.0	313.4	316.8	330.0
Total by water	691.5	723.9	688.5	693.6	717.4
By pipeline:					
Intrastate	1,329.1	1,296.7	1,208.3	1,282.8	1,291.6
Interstate	819.3	790.6	808.3	868.5	857.4
Foreign	37.3	47.8	30.4	33.4	40.6
Total by pipeline	2,185.7	2,135.1	2,047.0	2,184.7	2,189.6
By tank cars and trucks:					
Intrastate	28.9	31.9	27.6	31.8	33.9
Interstate	6.0	8.0	9.2	9.2	10.1
Foreign	------	0.1	------	------	------
Total by tank cars and trucks	34.9	40.0	36.8	41.0	44.0
Grand total	2,912.1	2,899.0	2,772.3	2,919.3	2,951.0

[1] Preliminary figures.

TABLE 31.—Refinery receipts of domestic crude oil by States and districts, 1960

(Thousand barrels)

Receiving State and district	Total domestic receipts	Intrastate receipts	Interstate receipts from—																	
			Ala. and Miss.	Ark.	Calif., Nev., and Alaska	Colo.	Fla. and N.Y.	Ill.	Ind. and Mich.	Kans.	Ky. and Ohio	La.	Mont.	Nebr., N.Dak., and S.Dak.	N.Mex.	Okla.	Texas	Utah	W.Va.	Wyo.	Total
Delaware, Massachusetts, Rhode Island	26,099	---	1,613	---	1,713	---	---	---	---	---	---	12,020	---	---	---	---	10,753	---	---	---	26,099
Florida, Georgia, South Carolina, Virginia	2,071	---	2,071	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,071
Maryland	977	---	719	---	199	---	---	---	---	---	---	---	---	---	---	---	59	---	---	---	977
New Jersey	56,132	---	2,125	---	210	---	216	---	---	---	---	22,879	---	---	---	---	30,702	---	---	---	56,132
New York:																					
East	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
West	17,648	---	---	---	---	---	---	2,420	---	2,223	---	---	3,009	---	---	2,998	6,998	---	---	---	17,648
Pennsylvania:																					
East	81,029	---	5,272	---	---	---	---	---	---	---	---	17,494	---	---	147	---	58,116	---	---	---	81,029
West	14,924	7,101	---	---	---	140	1,487	1,851	---	---	1,115	---	2,056	145	---	535	---	---	494	---	7,823
West Virginia	2,465	1,653	---	---	---	---	---	---	---	---	812	---	---	---	---	---	---	---	---	---	812
Total, District 1	201,345	8,754	11,800	---	2,122	140	1,703	4,271	---	2,223	1,927	52,393	5,065	145	147	3,533	106,628	---	494	---	192,591
Illinois	199,578	26,801	---	---	---	3,352	---	---	1,458	9,513	---	771	---	929	11,807	28,470	96,276	5,107	---	15,094	172,777
Indiana	153,777	1,335	---	---	---	7,985	---	7,525	364	21,491	35	---	8,028	9,515	7,720	27,114	24,880	---	---	37,785	152,442
Kansas	109,962	86,692	---	---	---	3,839	---	---	---	---	---	---	---	953	5,629	9,935	2,339	---	---	575	23,270
Kentucky, Tennessee	40,032	21,008	4,622	876	---	---	---	---	3,218	---	---	9,200	---	---	---	---	1,032	---	---	76	19,024
Michigan	47,374	15,610	---	---	---	249	---	3,268	---	81	---	---	1,779	1,325	---	---	11,500	---	---	13,562	31,764
Minnesota, Wisconsin	8,392	---	---	---	---	---	---	---	---	---	---	---	344	5,183	---	---	---	---	---	2,865	8,392
Missouri	22,229	---	---	---	---	---	---	---	---	128	---	---	---	---	11,859	1,084	6,197	---	---	2,961	22,229
Nebraska	907	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	907	907
North Dakota	15,951	15,951	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ohio:																					
East	36,713	3,005	491	333	---	333	---	27,396	---	2	1,519	698	370	---	---	1,643	---	---	---	923	33,708
West	92,381	28	355	1,878	240	2,556	---	13,697	---	89	1,451	16,613	---	3,399	1,450	9,621	39,020	---	---	1,984	92,353
Oklahoma	130,820	93,073	---	---	---	759	---	---	---	9,027	---	---	---	507	1,610	---	18,993	6,851	---	---	37,747
Total, District 2	858,116	263,503	5,468	3,087	240	19,073	---	51,886	5,040	40,331	3,005	27,282	10,521	21,811	40,075	77,867	200,237	11,958	---	76,732	594,613

Alabama, Mississippi	11,225	8,929	1,640	-----	299	-----	-----	-----	-----	-----	-----	354	-----	-----	-----	-----	3	-----	-----	-----	2,296
Arkansas	27,221	25,983	-----	-----	-----	-----	-----	-----	-----	-----	-----	1,238	-----	-----	-----	-----	-----	-----	-----	-----	1,238
Louisiana	243,102	169,806	32,593	8,656	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	36	32,011	-----	-----	-----	73,296
New Mexico	8,421	8,421	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Texas	800,597	615,312	401	-----	-----	-----	-----	-----	-----	-----	-----	124,507	-----	-----	47,462	8,004	-----	4,805	-----	106	185,285
Total, District 3	1,090,566	828,451	34,634	8,656	299	-----	-----	-----	-----	-----	-----	126,099	-----	-----	47,462	8,040	32,014	4,805	-----	106	262,115
Colorado	12,380	1,070	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1,822	-----	59	-----	-----	-----	-----	9,429	11,310
Montana	25,014	9,538	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	15,476	15,476
Utah	31,157	5,536	-----	-----	-----	20,156	-----	-----	-----	-----	-----	-----	-----	-----	296	-----	-----	-----	-----	5,169	25,621
Wyoming	35,735	33,436	-----	-----	-----	2,296	-----	-----	-----	-----	-----	-----	-----	3	-----	-----	-----	-----	-----	-----	2,299
Total, District 4	104,286	49,580	-----	-----	-----	22,452	-----	-----	-----	-----	-----	-----	1,822	3	355	-----	-----	-----	-----	30,074	54,706
California	318,026	301,049	-----	-----	493	-----	-----	-----	-----	-----	-----	-----	-----	-----	7,382	-----	-----	9,102	-----	-----	16,977
Washington, Oregon, Hawaii	8,101	-----	-----	-----	1,753	-----	-----	-----	-----	-----	-----	-----	-----	-----	3,879	-----	-----	2,469	-----	-----	8,101
Total, District 5	326,127	301,049	-----	-----	2,246	-----	-----	-----	-----	-----	-----	-----	-----	-----	11,261	-----	-----	11,571	-----	-----	25,078
Total, 1960	2,580,440	1,451,337	51,902	11,743	4,907	41,665	1,703	56,157	5,040	42,554	4,932	205,774	17,408	21,959	99,300	89,440	338,879	28,334	494	106,912	1,129,103
Daily average, 1960	7,050	3,965	141	32	14	114	4	154	14	116	13	562	48	60	271	245	926	77	1	293	3,085
Daily average, 1959	7,039	3,969	137	36	22	97	1	155	20	129	13	438	37	44	260	259	1,061	80	1	280	3,070

TABLE 32.—Crude runs to stills and refinery receipts of crude oil by origin of the crude and method of transportation by States and districts, 1960

(Thousand barrels)

Receiving State and District	Crude runs to stills	Refinery fuel use and losses	Refinery receipts of domestic crude: By State of origin of domestic crude	Change in refinery stocks	By receiving State and method of transportation: Intrastate: Pipelines	Intrastate: Tank cars and trucks	Intrastate: Tankers and barges	Interstate: Pipelines	Interstate: Tank cars and trucks	Interstate: Tankers and barges	Refinery receipts of foreign crude
Delaware, Massachusetts, Rhode Island	51,305	122	----------	−202	----------	----------	----------	----------	----------	26,099	25,126
Florida, Georgia, South Carolina, Virginia	17,643	−1	216	+7	----------	----------	----------	----------	450	1,621	15,578
Maryland	6,625	−8	----------	−264	----------	----------	----------	----------	----------	977	5,376
New Jersey	147,446	61	----------	+163	----------	----------	----------	----------	----------	56,132	91,538
New York:											
East	8,114	----------	----------	−98	----------	----------	----------	----------	----------	----------	8,016
West	17,655	----------	1,487	−17	----------	----------	----------	17,648	----------	----------	----------
Pennsylvania:											
East	179,011	175	----------	+212	----------	----------	----------	----------	----------	81,029	98,369
West	14,993	−9	7,101	−60	7,085	16	----------	6,627	119	1,077	----------
West Virginia	2,493	----------	2,147	−28	1,636	17	----------	403	409	----------	----------
Total, District 1	[1] 445,295	340	10,951	−287	8,721	33	----------	24,678	978	166,935	244,003
Illinois	200,255	−50	82,958	−627	26,711	90	----------	172,006	----------	771	----------
Indiana	154,023	16	6,011	−262	485	850	----------	151,978	464	----------	----------
Kansas	109,940	----------	129,246	+22	85,183	1,509	----------	23,157	113	----------	----------
Kentucky, Tennessee	40,126	----------	23,978	−94	8,179	396	12,433	4,304	109	14,611	----------
Michigan	49,768	18	15,974	+130	14,566	1,044	----------	31,764	----------	----------	[2] 2,542
Minnesota, Wisconsin	28,501	−2	----------	−540	----------	----------	----------	1,149	5,279	1,964	[2] 19,567
Missouri	22,446	2	----------	−219	----------	----------	----------	22,229	----------	----------	----------
Nebraska	902	----------	16,776	+5	----------	----------	----------	890	17	----------	----------
North and South Dakota	15,988	3	21,134	−40	15,370	581	----------	----------	----------	----------	----------
Ohio:											
East	36,680	−4	----------	+37	2,510	495	----------	33,708	----------	----------	----------
West	94,286	2	4,995	−200	2	26	----------	92,113	----------	240	[3] 1,707
Oklahoma	131,042	42	182,513	−264	90,567	2,506	----------	37,747	----------	----------	----------
Total, District 2	883,957	27	483,585	−2,052	243,573	7,497	12,433	571,045	5,982	17,586	23,816

Alabama, Mississippi	11,321	12	60,831	+49	5,600	1 940	1,389	----	261	2,035	157
Arkansas	27,351	−4	37,726	−126	24,750	1,233	----	1,183	55	----	----
Louisiana	243,037	144	375,580	+340	126,293	1,962	41,551	71,591	36	1,669	419
New Mexico	8,490	7	107,721	−76	8,256	165	----	----	----	----	----
Texas	801,775	155	954,191	−296	571,578	10,209	33,525	120,484	12	64,789	1,037
Total, District 3	1,091,974	314	1,536 049	−109	736,477	15,509	76,465	193,258	364	68,493	1,613
Colorado	12,349	−16	42,735	+47	234	836	----	11,246	64	----	----
Montana	25,004	−1	26,946	+31	8,653	885	----	15,476	----	----	[4] 20
Utah	31,126	1	33,870	+30	5,339	197	----	25,235	386	----	----
Wyoming	35,958	1	140,348	−224	31,770	1,666	----	----	2,299	----	----
Total, District 4	104,437	−15	243,899	−116	45,996	3,584	----	51,957	2,749	----	20
California, Nevada, Alaska	383,053	680	305,956	−1,271	256,844	7,270	36,935	16,484	----	493	64,436
Washington, Oregon, Hawaii	43,818	22	----	+980	----	----	----	----	----	8,101	[5] 36,719
Total, District 5	426,871	702	305,956	−291	256,844	7,270	36,935	16,484	----	8,594	101,155
Total 1960	2,952,534	1,368	2,580,440	−2,855	1,291,611	33,893	125,833	857,422	10,073	261,608	[6] 370,607
Daily average	8,067	4	7,050	−8	3,528	93	344	2,342	28	715	1,013
Daily average, 1959	7,994	5	7,039	−1	3,515	87	367	2,380	25	665	959

1 Includes 219,286 in Delaware River Valley.
2 Pipeline.
3 Includes pipeline 454; barges 1,253.
4 Tank cars and trucks.
5 Includes pipeline 18,064; tankers 18,655.
6 Excludes crude oil imported for direct fuel use.

TABLE 33.—Daily average total demand for crude petroleum in the United States in 1959–60, by State of origin and months

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Year
1959:													
Alabama	18.3	15.3	13.5	18.8	5.6	14.2	18.0	13.5	18.0	15.8	18.7	15.0	15.4
Arkansas	80.3	82.9	74.2	87.2	81.5	69.0	67.0	60.5	65.7	64.2	64.8	70.5	72.2
California	831.8	821.3	851.6	862.2	882.8	830.9	915.7	884.2	872.5	875.2	858.7	811.5	858.5
Colorado	126.5	127.8	134.7	109.5	121.4	120.3	138.9	124.2	133.4	129.1	97.7	146.0	125.9
Florida	.2	.7	.5	4.3	.5	.6	.5	.3	.6	4.1	.4	.7	1.1
Illinois	230.1	277.3	207.3	192.7	170.4	204.6	198.7	218.2	212.2	197.4	212.6	244.6	213.4
Indiana	40.4	31.1	31.5	28.2	29.8	32.7	32.2	32.0	32.5	28.7	33.0	36.4	32.4
Kansas	350.3	354.1	354.6	292.5	297.9	345.3	306.6	319.1	365.2	304.5	326.0	327.1	328.4
Kentucky	73.7	66.8	63.1	73.3	81.7	87.7	78.8	70.9	72.0	73.6	70.8	70.7	73.6
Louisiana	951.5	930.9	949.0	963.7	984.3	949.4	986.1	1,033.3	1,022.1	992.5	1,051.9	1,066.8	990.5
Michigan	25.8	26.6	26.2	25.0	27.3	23.6	32.3	24.3	19.3	34.6	30.7	35.6	27.7
Mississippi	121.6	127.3	127.6	131.3	142.3	129.8	136.1	147.7	158.0	130.8	138.4	140.7	136.0
Montana	73.5	80.3	91.1	81.3	74.8	64.6	72.0	85.5	96.8	55.4	89.9	93.2	79.8
Nebraska	63.1	56.9	43.7	67.4	42.6	61.1	67.9	67.9	65.7	70.0	61.6	68.1	61.3
New Mexico	268.5	287.3	292.0	326.3	257.1	287.7	276.7	296.7	296.9	276.0	300.4	294.5	288.3
New York	6.3	5.4	6.2	5.7	5.2	5.7	5.7	5.4	5.5	5.4	5.4	5.5	5.6
North Dakota	46.8	49.1	44.0	49.6	47.2	50.7	53.4	46.0	52.0	20.2	58.7	59.3	48.0
Ohio	18.1	7.4	24.8	12.8	20.3	17.0	14.2	17.1	14.3	16.2	17.1	16.5	16.4
Oklahoma	576.1	556.8	556.9	565.3	554.2	545.1	542.6	530.9	508.7	522.9	497.4	523.1	540.1
Pennsylvania	16.5	15.0	18.6	14.8	13.9	24.6	16.0	12.3	19.3	19.1	20.4	20.0	17.5
Texas	2,948.0	2,840.9	2,923.5	2,822.3	2,786.4	2,613.3	2,434.8	2,700.6	2,432.6	2,451.4	2,547.1	2,667.5	2,680.2
Utah	101.9	116.8	112.4	115.2	100.8	124.3	113.1	117.2	109.5	96.6	109.2	97.7	109.4
West Virginia	6.5	5.4	5.6	6.9	2.1	3.6	5.0	5.9	7.7	7.4	5.3	7.2	5.7
Wyoming	323.2	332.4	357.9	251.3	327.1	364.1	368.9	336.4	361.1	309.0	348.5	337.8	334.9
Other States	1.5	.9	.7	.5	.5	.9	1.4	1.4	1.9	2.0	2.0	1.9	[1] 1.3
Total domestic crude	7,300.5	7,216.7	7,311.2	7,108.1	7,057.7	6,970.8	6,882.6	7,151.5	6,943.5	6,702.1	6,966.7	7,157.9	7,063.6
Foreign crude	997.0	960.8	948.6	802.9	875.6	1,051.1	1,031.3	964.0	965.9	979.0	1,046.8	1,025.1	970.8
Grand total 1959	8,297.5	8,177.5	8,259.8	7,911.0	7,933.3	8,021.9	7,913.9	8,115.5	7,909.4	7,681.1	8,013.5	8,183.0	8,034.4
Pennsylvania Grade (included above)	33.0	30.1	34.8	30.4	24.0	39.8	29.8	28.2	36.7	36.3	34.1	38.8	33.0
1960: [2]													
Alabama	15.9	22.3	14.6	14.8	25.8	19.6	18.1	19.5	30.0	21.5	15.7	24.5	20.2
Arkansas	67.7	87.6	77.6	76.5	88.8	75.6	84.0	84.5	78.9	78.1	85.5	73.1	79.8
California	849.0	782.1	842.3	855.8	839.7	814.0	901.1	865.8	839.4	806.7	858.4	858.1	843.0
Colorado	137.0	126.8	116.2	122.7	129.7	118.9	136.6	136.3	135.3	123.4	131.6	135.9	129.2
Florida	.2	.6	.5	4.1	.5	.7	.5	.3	.6	.6	.6	.6	.8
Illinois	226.9	211.2	221.8	193.4	194.2	219.5	218.4	243.2	232.0	227.2	213.5	229.6	219.3
Indiana	29.5	31.8	31.6	29.9	32.8	26.4	32.1	36.1	35.6	27.6	32.6	34.3	31.7
Kansas	323.5	306.9	309.9	264.9	316.6	312.5	328.2	345.5	312.1	290.0	308.5	310.4	310.9
Kentucky	68.9	67.0	56.8	63.8	61.2	60.1	57.5	69.5	60.4	56.6	50.9	54.4	60.6
Louisiana	1,059.2	1,048.1	1,073.6	1,106.7	1,031.9	1,069.2	1,089.5	1,031.2	1,033.3	1,126.2	1,079.1	1,107.8	1,071.4
Michigan	35.7	37.2	34.8	40.9	30.8	35.3	38.6	51.5	49.0	46.4	55.0	55.3	42.5

Mississippi	149.2	130.2	139.8	145.7	153.8	130.6	127.8	140.7	156.7	138.7	138.1	147.5	141.6
Montana	74.4	85.8	89.9	70.2	75.5	78.8	91.4	87.1	79.4	80.8	90.5	89.3	82.8
Nebraska	72.3	65.6	60.6	52.9	60.9	68.8	73.1	79.1	70.9	75.9	63.8	61.4	67.1
New Mexico	307.1	315.5	282.5	266.6	304.8	280.6	288.5	318.2	301.6	264.0	304.4	314.4	295.6
New York	4.7	5.0	5.1	5.3	5.1	5.3	4.9	4.9	5.0	4.6	4.8	4.7	4.9
North Dakota	60.2	56.6	48.0	58.8	60.6	58.7	57.3	66.2	58.4	61.3	61.3	66.3	59.5
Ohio	16.6	15.0	14.5	11.4	10.6	12.1	16.1	13.6	12.8	15.3	10.5	16.0	13.7
Oklahoma	557.5	558.5	506.0	538.3	474.7	547.3	532.7	554.7	546.8	500.0	516.4	520.6	529.2
Pennsylvania	24.4	14.6	19.5	18.4	18.1	18.0	14.5	14.7	19.9	17.6	16.6	18.7	17.9
Texas	2,823.2	2,697.4	2,551.0	2,624.9	2,609.4	2,612.7	2,603.9	2,535.0	2,502.9	2,448.1	2,462.3	2,488.8	2,579.4
Utah	116.1	110.2	94.8	112.8	93.6	108.9	101.4	100.5	96.5	90.2	92.3	107.0	102.0
West Virginia	6.2	5.4	6.7	5.8	6.7	5.7	6.5	6.7	6.2	6.7	9.1	4.6	6.4
Wyoming	358.5	319.3	359.6	346.1	301.1	399.9	432.4	412.2	397.0	378.4	369.0	370.1	370.5
Other States	1.3	1.3	2.1	1.8	1.9	1.2	2.4	2.0	2.6	1.6	1.9	6.4	[3] 2.4
Total domestic crude	7,385.2	7,102.0	6,959.8	7,032.5	6,928.8	7,080.4	7,257.5	7,219.0	7,063.3	6,887.5	6,972.4	7,099.8	7,082.7
Foreign crude	926.8	997.8	987.7	959.3	1,062.5	1,083.0	1,077.7	1,057.4	1,067.8	1,051.8	942.0	966.7	1,015.2
Grand total 1960	8,312.0	8,099.8	7,947.5	7,991.8	7,991.3	8,163.4	8,335.2	8,276.4	8,131.1	7,939.3	7,914.4	8,066.5	8,097.9
Pennsylvania Grade (included above)	40.2	29.1	35.2	34.1	33.0	33.3	29.0	30.1	34.7	33.3	32.7	35.4	33.4

[1] Alaska, 0.5; Arizona, 0.1; Missouri, 0.2; Nevada, 0.1; South Dakota, 0.4; Tennessee, Virginia and Washington were less than 0.05.

[2] Preliminary figures.

[3] Alaska, 1.0; Arizona, 0.2; Missouri, 0.2; Nevada, 0.1; South Dakota, 0.8; Tennessee, Virginia and Washington were less than 0.05.

TABLE 34.—Total demand for crude petroleum in the United States, 1959–60, by States of origin and months

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959:													
Alabama	566	429	418	564	175	426	557	420	539	490	560	466	5,610
Arkansas	2,489	2,322	2,299	2,617	2,527	2,069	2,078	1,876	1,971	1,990	1,943	2,184	26,365
California	25,786	22,995	26,399	25,866	27,368	24,926	28,388	27,409	26,176	27,130	25,762	25,155	313,360
Colorado	3,923	3,579	4,175	3,286	3,763	3,608	4,305	3,851	4,001	4,002	2,935	4,525	45,953
Florida	6	20	16	130	17	18	14	10	18	128	11	23	411
Illinois	7,134	7,765	6,427	5,781	5,281	6,139	6,161	6,763	6,365	6,118	6,379	7,584	77,897
Indiana	1,252	873	976	845	925	981	998	991	974	889	991	1,127	11,822
Kansas	10,858	9,915	10,993	8,776	9,235	10,360	9,506	9,892	10,956	9,440	9,780	10,141	119,852
Kentucky	2,286	1,869	1,957	2,200	2,534	2,631	2,439	2,199	2,160	2,281	2,120	2,192	26,868
Louisiana	29,498	26,064	29,420	28,910	30,514	28,484	30,565	32,033	30,663	30,768	31,556	33,071	361,546
Michigan	801	745	812	749	846	707	1,002	753	580	1,073	921	1,105	10,094
Mississippi	3,770	3,565	3,955	3,938	4,412	3,893	4,220	4,580	4,740	4,056	4,151	4,363	49,643
Montana	2,280	2,249	2,823	2,440	2,320	1,937	2,231	2,651	2,906	1,718	2,697	2,888	29,140
Nebraska	1,957	1,592	1,355	2,023	1,320	1,832	2,106	2,106	1,971	2,170	1,849	2,111	22,392
New Mexico	8,323	8,044	9,052	9,788	7,969	8,631	8,579	9,198	8,907	8,556	9,013	9,129	105,189
New York	196	151	192	170	162	170	178	166	165	167	163	170	2,050
North Dakota	1,451	1,376	1,363	1,488	1,462	1,521	1,655	1,427	1,560	626	1,762	1,838	17,529
Ohio	558	206	769	383	629	510	441	530	429	501	513	511	5,980
Oklahoma	17,856	15,592	17,264	16,960	17,177	16,355	16,820	16,457	15,260	16,210	14,918	16,216	197,085
Pennsylvania	510	420	578	444	431	738	497	381	578	592	613	620	6,402
Texas	91,389	79,544	90,628	84,669	86,375	78,400	75,480	83,714	72,977	75,994	76,412	82,692	978,274
Utah	3,159	3,270	3,485	3,455	3,124	3,728	3,505	3,632	3,285	2,996	3,276	3,028	39,943
West Virginia	202	150	173	207	66	109	156	184	232	228	160	224	2,091
Wyoming	10,019	9,306	11,094	7,339	10,141	10,922	11,437	10,428	10,833	9,580	10,456	10,472	122,227
Other States	47	26	23	15	17	28	43	44	57	61	60	59	[1] 480
Total domestic crude	226,316	202,067	226,646	213,043	218,790	209,123	213,361	221,695	208,303	207,764	209,001	221,894	2,578,203
Foreign crude	30,908	26,903	29,406	24,088	27,144	31,533	31,971	29,884	28,978	30,348	31,403	31,778	354,344
Grand total 1959	257,224	228,970	256,052	237,331	245,934	240,656	245,332	251,579	237,281	238,112	240,404	253,672	2,932,547
Daily average:													
Domestic crude	7,301	7,217	7,311	7,108	7,058	6,971	6,883	7,151	6,943	6,702	6,967	7,158	7,064
Domestic and foreign crude	8,298	8,178	8,260	7,911	7,933	8,022	7,914	8,115	7,909	7,681	8,013	8,183	8,034
Pennsylvania Grade (included above)	1,022	844	1,078	912	744	1,193	925	873	1,100	1,126	1,023	1,204	12,044
1960: [2]													
Alabama	494	647	450	443	800	587	562	603	900	667	472	761	7,386
Arkansas	2,098	2,540	2,408	2,296	2,754	2,267	2,604	2,619	2,364	2,422	2,565	2,265	29,202
California	26,318	22,680	26,112	25,674	26,033	24,420	27,935	26,841	25,181	25,008	25,752	26,600	308,554
Colorado	4,246	3,677	3,601	3,682	4,020	3,566	4,236	4,226	4,059	3,824	3,948	4,213	47,298
Florida	6	17	18	124	18	21	17	11	18	17	17	19	303

Illinois	7,033	6,125	6,876	5,802	6,020	6,585	6,770	7,540	6,961	7,042	6,406	7,118	80,278
Indiana	916	921	980	899	1,017	792	994	1,120	1,068	857	975	1,062	11,601
Kansas	10,030	8,901	9,605	7,946	9,813	9,374	10,174	10,709	9,364	8,990	9,256	9,623	113,785
Kentucky	2,137	1,942	1,761	1,914	1,898	1,803	1,784	2,156	1,811	1,755	1,526	1,687	22,174
Louisiana	32,834	30,396	33,280	33,199	31,989	32,076	33,775	31,968	31,000	34,912	32,372	34,342	392,143
Michigan	1,106	1,079	1,078	1,228	954	1,060	1,196	1,596	1,470	1,438	1,650	1,713	15,568
Mississippi	4,624	3,777	4,336	4,373	4,767	3,917	3,961	4,362	4,703	4,299	4,144	4,570	51,833
Montana	2,307	2,487	2,789	2,107	2,340	2,364	2,834	2,700	2,381	2,507	2,716	2,767	30,299
Nebraska	2,240	1,901	1,880	1,586	1,887	2,064	2,266	2,448	2,127	2,353	1,910	1,903	24,565
New Mexico	9,520	9,150	8,756	7,996	9,449	8,418	8,945	9,863	9,048	8,183	9,132	9,747	108,207
New York	147	146	156	160	157	158	151	151	150	143	143	143	1,805
North Dakota	1,865	1,642	1,489	1,764	1,880	1,761	1,775	2,052	1,752	1,900	1,840	2,055	21,775
Ohio	515	435	447	342	330	364	500	423	383	475	316	496	5,026
Oklahoma	17,282	16,196	15,689	16,148	14,715	16,418	16,515	17,198	16,405	15,500	15,491	16,138	193,695
Pennsylvania	756	422	606	550	560	541	451	455	598	546	499	580	6,564
Texas	87,520	78,224	79,082	78,747	80,892	78,381	80,721	78,584	75,086	75,891	73,869	77,154	944,151
Utah	3,600	3,197	2,937	3,382	2,901	3,267	3,143	3,112	2,896	2,795	2,768	3,317	37,315
West Virginia	193	156	207	174	209	172	197	208	187	208	273	144	2,328
Wyoming	11,113	9,259	11,148	10,384	9,334	11,997	13,405	12,781	11,911	11,732	11,071	11,473	135,608
Other states	42	40	66	55	57	38	76	63	77	50	60	202	[3] 826
Total domestic crude	228,942	205,957	215,757	210,975	214,794	212,411	224,987	223,789	211,900	213,514	209,171	220,092	2,592,289
Foreign crude	28,731	28,937	30,617	28,779	32,939	32,491	33,405	32,778	32,035	32,607	28,263	29,966	371,548
Grand total 1960	257,673	234,894	246,374	239,754	247,733	244,902	258,392	256,567	243,935	246,121	237,434	250,058	2,963,837
Daily average:													
Domestic crude	7,385	7,102	6,960	7,032	6,929	7,080	7,258	7,219	7,063	6,888	6,972	7,100	7,083
Domestic and foreign crude	8,312	8,100	7,948	7,992	7,991	8,163	8,335	8,276	8,131	7,939	7,914	8,066	8,098
Pennsylvania Grade (included above)	1,247	845	1,091	1,023	1,025	998	899	932	1,041	1,032	981	1,098	12,212

[1] Alaska, 187; Arizona, 25; Missouri, 75; Nevada, 32; South Dakota, 148; Tennessee, 6; Virginia, 6; and Washington, 1.

[2] Preliminary figures.

[3] Alaska, 360; Arizona, 73; Missouri, 72; Nevada, 25; South Dakota, 283; Tennessee, 6; Virginia, 6; and Washington, 1.

STOCKS

Total stocks of all oils declined 30.2 million barrels in 1960. Stocks of crude oil were down 17.3 million barrels. Refined product stocks declined 16.9 million barrels. Stocks of natural gas liquids increased 4.0 million barrels.

During the year, a concerted effort was made by spokesmen of the of the petroleum industry, trade publications, and State regulatory agencies to get industrywide cooperation in tailoring new supply to demand. The purpose was to avoid heavy stock buildups, which cause an excess of products seeking markets with resultant price cutting.

TABLE 35.—Stocks of crude petroleum, natural-gas liquids, and refined products in the United States at end of year

(Thousand barrels)

Product	1956	1957	1958 [1]	1959 [1]	1959 [2]	1959 [3]	1960 [3]
Crude petroleum:							
At refineries	71,721	76,576	69,568	69,305	69,305	69,305	66,450
Pipeline and tank farm	173,278	183,526	172,458	167,147	167,147	167.147	152,848
Producers	21,015	21,711	20,704	20,665	20,677	20,677	20,502
Total crude petroleum	266,014	281,813	262,730	257,117	257,129	257,129	239,800
Natural-gas liquids	20,559	20,156	22,752	24,887	24,887	24,887	28,931
Refined products	493,818	537,937	503,314	525,053	526,026	526,954	510,004
Grand total	780,391	839,906	788,796	807,057	808,042	808,970	778,735

[1] Old basis, excludes bulk terminal stocks in Alaska as follows: 1958: crude, 12,000 barrels; refined products 730,000 barrels. 1959: crude, 12,000 barrels; refined products, 973,000 barrels.
[2] Includes Alaska. For details, see table 4.
[3] Includes Alaska and Hawaii. For details on Hawaii in 1959, see table 5.

TABLE 36.—Stocks of crude petroleum in the United States by State of origin, by month, 1960

(Thousand barrels)

State of origin	Jan. 1	Jan. 31	Feb. 29	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	522	519	313	400	540	419	481	577	631	367	365	519	393
Alaska	12	3	2	2	2	5	17	11	19	24	106	215	210
Arkansas	2,035	2,121	1,949	1,941	2,017	1,848	1,904	1,743	1,552	1,585	1,702	1,583	1,786
California, Arizona	28,913	28,290	29,614	29,247	28,613	28,471	29,172	27,098	25,942	25,545	26,358	25,630	24,715
Colorado	3,242	2,961	2,983	3,371	3,520	3,462	3,742	3,487	3,156	3,017	3,249	3,215	3,109
Florida	80	109	127	145	51	64	71	85	104	113	124	134	145
Illinois	7,826	7,668	7,713	7,342	7,998	8,613	8,617	8,463	7,690	7,276	6,950	7,082	6,388
Indiana	328	421	439	409	467	421	540	506	461	335	429	405	317
Kansas	9,728	9,431	9,472	9,122	10,571	10,308	10,020	9,256	8,333	8,420	9,040	9,353	9,398
Kentucky	2,056	1,892	1,675	1,658	1,592	1,573	1,609	1,561	1,278	1,136	1,098	1,168	1,026
Louisiana	17,347	18,135	19,038	19,473	18,778	18,835	17,962	16,711	17,329	17,911	17,153	18,480	19,564
Michigan	1,162	1,083	1,025	1,124	1,067	1,124	1,321	1,425	1,285	1,256	1,432	1,317	1,259
Mississippi	2,360	2,387	2,786	2,630	2,364	2,080	2,378	2,640	2,583	2,078	2,124	2,375	2,346
Montana	3,253	3,502	3,481	3,235	3,571	3,641	3,702	3,472	3,389	3,527	3,619	3,412	3,194
Nebraska	1,963	1,710	1,627	1,671	1,944	2,076	2,062	1,996	1,794	1,737	1,569	1,663	1,826
New Mexico	8,358	8,161	7,851	8,506	9,221	8,706	9,046	9,132	8,563	8,399	9,304	9,191	8,091
New York	43	46	45	47	42	44	43	39	39	39	43	47	39
North Dakota	1,106	1,030	1,182	1,201	1,025	829	892	1,030	1,051	1,132	1,141	1,207	1,285
Ohio	644	562	527	505	577	658	714	614	637	671	605	700	578
Oklahoma	18,413	18,471	18,434	19,437	19,212	20,730	19,679	18,816	17,459	16,082	16,595	16,905	17,006
Pennsylvania	1,218	971	1,043	948	933	917	930	974	1,082	1,023	1,004	1,026	912
South Dakota	5	8	14	15	3	4	3	3	3	3	3	3	3
Texas	111,132	107,759	109,023	113,353	112,511	107,555	104,237	98,912	96,415	96,358	95,800	97,728	100,613
Utah	3,148	2,968	2,939	3,387	3,183	3,426	3,319	3,121	2,944	2,938	2,712	3,299	3,432
West Virginia	653	627	632	619	644	628	662	650	650	674	670	604	643
Wyoming	17,601	17,511	18,441	17,798	17,306	18,808	17,881	16,340	15,629	15,591	16,215	16,970	17,514
Total domestic crude	243,148	238,346	242,375	247,595	247,752	245,254	241,004	228,662	220,018	217,237	219,410	224,231	225,792
Foreign [1]	13,981	13,860	14,653	13,328	18,426	16,058	16,297	14,083	14,073	14,729	13,580	15,297	14,008
Grand total	257,129	252,206	257,028	260,923	266,178	261,312	257,301	242,745	234,091	231,966	232,990	239,528	239,800
Pennsylvania grade (includes above)	2,154	1,852	1,921	1,814	1,803	1,789	1,836	1,887	2,011	2,002	1,984	2,007	1,815

[1] Includes foreign crude petroleum held in P.A.D. district V: December 1959, 4,524,000 January, 4,107,000 February, 4,035,000; March, 3,685,000; April, 4,593,000; May, 4,416,000; June, 4,093,000; July, 3,162,000; August, 3,732,000; September, 4,911,000; October, 4,485,000; November, 4,719,000; December, 4,881,000 barrels.

TABLE 37.—Stocks of crude petroleum in the United States by location, by month, 1960

(Thousand barrels)

State	Jan. 1	Jan. 31	Feb. 29	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	497	556	536	509	575	427	484	593	479	253	324	361	226
Alaska	12	3	2	2	2	5	17	11	19	24	106	144	93
Arizona	448	453	455	451	451	450	450	452	455	453	450	450	450
Arkansas	1,984	2,131	2,023	2,009	1,944	1,839	1,750	1,799	1,671	1,667	1,635	1,654	1,560
California, Oregon, Washington	33,815	32,779	34,088	33,368	33,337	33,074	33,226	30,230	30,099	30,438	30,691	30,227	29,244
Colorado	1,714	1,526	1,594	1,629	1,932	1,759	1,751	1,642	1,540	1,576	1,521	1,659	1,517
Florida, Georgia, South Carolina, Virginia	888	772	915	878	888	937	839	778	814	980	881	661	854
Hawaii	------	------	------	------	------	------	------	------	------	236	372	674	950
Illinois	15,693	15,292	15,436	15,144	15,458	16,495	16,720	15,045	15,112	14,403	13,953	14,066	14,416
Indiana	4,589	4,768	4,651	4,699	4,817	4,965	5,135	5,193	4,761	4,578	4,831	4,550	4,325
Iowa, Missouri	6,810	6,778	6,967	7,184	7,161	6,899	6,901	6,755	6,648	6,502	6,533	6,290	6,372
Kansas	10,657	10,434	10,790	10,851	11,762	12,280	11,665	10,746	9,785	9,713	10,645	11,435	11,193
Kentucky, Tennessee	3,676	3,529	3,618	3,512	3,439	3,634	3,403	3,268	2,969	3,080	2,695	3,102	2,914
Louisiana	13,815	13,552	14,502	14,508	14,589	13,134	13,051	13,084	12,872	13,164	12,893	13,716	14,774
Maryland	578	713	851	827	648	671	905	678	386	647	508	346	314
Massachusetts, Delaware, Rhode Island	1,606	1,570	1,511	1,809	1,710	2,413	2,274	1,745	2,085	1,971	1,464	1,913	1,404
Michigan	1,939	1,851	1,860	1,881	1,909	2,005	2,133	2,184	2,045	1,941	2,294	2,129	2,169
Minnesota, Wisconsin	1,317	1,108	1,208	1,191	1,359	1,364	1,242	1,245	1,297	1,229	1,140	1,505	1,275
Mississippi	1,939	1,837	2,065	2,108	1,994	2,088	2,040	1,871	1,922	1,735	1,593	1,837	1,755
Montana	1,852	1,949	2,042	2,200	2,163	2,175	2,210	1,906	1,829	1,819	1,988	1,789	1,985
Nebraska	1,736	1,712	1,748	1,761	1,809	1,846	1,888	1,690	1,529	1,542	1,578	1,562	1,674
New Jersey	5,400	6,076	5,204	5,727	6,576	5,104	6,500	5,922	5,943	5,793	5,123	5,891	5,816
New Mexico	3,598	3,604	3,473	3,294	3,609	3,304	3,284	3,133	3,201	3,252	3,417	3,863	3,619
New York	866	554	669	713	904	678	865	557	560	785	516	537	714
North Dakota	896	894	1,056	1,007	849	713	709	789	818	828	814	847	930
Ohio	6,646	6,415	6,316	6,214	6,414	6,761	6,880	7,286	6,728	6,214	6,144	6,217	5,977
Oklahoma	21,069	18,816	19,467	21,083	21,162	21,580	21,400	20,341	17,442	16,863	18,070	18,124	18,518
Pennsylvania	8,553	8,723	8,301	7,693	11,063	10,214	9,181	9,668	8,905	8,972	8,755	8,955	7,990
South Dakota	4	4	4	4	3	4	3	3	3	3	3	3	3
Texas	92,269	91,757	94,028	96,924	96,198	92,135	88,349	83,089	82,047	81,562	81,987	83,966	85,364
Utah	947	951	855	1,016	1,076	987	1,176	1,019	873	995	1,020	943	1,044
West Virginia	639	592	597	571	620	627	670	654	684	681	649	656	630
Wyoming	10,677	10,507	10,196	10,156	9,757	10,745	10,200	9,369	8,570	8,067	8,397	9,456	9,689
Total	257,129	252,206	257,028	260,923	266,178	261,312	257,301	242,745	234,091	231,966	232,990	239,528	239,758

TABLE 38.—Stocks of crude petroleum in the United States by classification and location, by month, 1960

(Thousand barrels)

Classification and location	Jan. 1	Jan. 31	Feb. 29	Mar. 31	Apr. 30	May. 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
At refineries:													
Alabama	237	267	221	322	279	255	273	266	243	196	268	308	196
Arkansas	516	516	473	491	502	432	426	527	400	406	373	445	390
California, Oregon, Washington	14,844	14,291	14,851	14,817	14,962	15,505	15,399	13,354	13,611	13,928	14,579	13,707	13,603
Colorado	139	169	230	191	316	267	283	267	248	291	195	257	186
Florida, Georgia, South Carolina, Virginia	808	663	788	842	837	873	768	693	710	867	757	633	815
Hawaii	------	------	------	------	------	------	------	------	------	236	372	674	950
Illinois	3,842	3,784	3,787	3,814	3,413	4,125	4,048	3,423	3,673	3,500	2,850	3,073	3,215
Indiana	1,949	2,124	1,951	1,926	1,904	1,746	1,789	1,836	1,810	1,865	2,076	1,832	1,687
Kansas	1,563	1,480	1,432	1,388	1,807	1,781	1,611	1,509	1,508	1,379	1,675	1,679	1,585
Kentucky, Tennessee	1,434	1,309	1,483	1,248	1,290	1,494	1,320	1,375	1,108	1,364	895	1,457	1,340
Louisiana	4,636	4,143	4,658	5,112	4,989	4,149	4,112	4,177	4,183	4,055	3,911	4,775	4,976
Maryland	578	713	851	827	648	671	905	678	386	647	508	346	314
Massachusetts, Delaware, Rhode Island	1,606	1,570	1,511	1,809	1,710	2,413	2,274	1,745	2,085	1,971	1,464	1,913	1,404
Michigan	866	781	832	806	834	873	954	1,023	925	860	905	949	996
Minnesota, Wisconsin	1,317	1,108	1,208	1,191	1,359	1,364	1,242	679	649	683	659	936	777
Mississippi	66	100	147	151	114	119	130	132	185	161	118	149	156
Missouri	463	470	489	454	387	348	263	214	255	240	256	226	244
Montana	622	587	642	619	625	690	798	644	643	598	748	504	653
Nebraska	46	37	49	42	59	58	56	57	61	62	30	41	51
New Jersey	5,386	5,604	5,204	5,041	6,337	5,028	6,258	5,797	5,937	5,668	5,117	5,885	5,549
New Mexico	228	247	241	227	208	184	214	189	199	194	250	233	152
New York	624	335	434	493	679	458	664	370	358	609	287	330	509
North Dakota	380	356	372	364	281	182	179	238	261	268	291	310	340
Ohio	1,413	1,565	1,634	1,619	1,626	1,920	1,841	1,877	1,728	1,689	1,691	1,621	1,250
Oklahoma	2,786	2,799	2,683	3,161	3,640	3,193	3,311	3,134	2,630	2,456	2,346	2,627	2,522
Pennsylvania	6,734	7,149	6,965	6,406	9,784	8,895	7,918	8,298	7,543	7,584	7,339	7,635	6,886
Texas	14,942	15,486	17,416	17,191	17,351	15,889	15,924	14,983	14,002	14,708	13,633	13,961	14,646
Utah	383	398	364	450	423	420	610	521	350	417	439	400	413
West Virginia	71	41	57	57	61	51	47	51	55	51	51	47	43
Wyoming	826	803	706	697	744	722	815	744	639	515	558	645	602
Total at refineries	69,305	68,895	71,679	71,756	77,169	74,105	74,432	68,801	66,385	67,468	64,641	67,598	66,450

TABLE 38.—Stocks of crude petroleum in the United States by classification and location, by month, 1960—Continued

(Thousand barrels)

Classification and location	Jan. 1	Jan. 31	Feb. 29	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Pipeline and tank-farm stocks:													
Alabama	242	275	300	170	284	158	197	314	221	41	45	38	18
Alaska						3	15	9	17	23	102	142	91
Arkansas	1,108	1,260	1,195	1,153	1,067	1,052	984	937	941	931	932	884	845
California, Arizona	14,861	14,431	15,137	14,476	14,258	13,346	13,760	13,075	12,567	12,490	11,969	12,392	11,830
Colorado	1,425	1,217	1,219	1,268	1,451	1,347	1,323	1,240	1,167	1,165	1,211	1,282	1,216
Florida, New Jersey	83	571	118	715	282	131	304	201	100	232	120	23	293
Illinois	11,302	10,944	11,085	10,781	11,506	11,826	12,148	11,068	10,910	10,384	10,574	10,459	10,672
Indiana	2,570	2,574	2,625	2,703	2,843	3,149	3,276	3,287	2,886	2,648	2,690	2,658	2,578
Iowa, Missouri	6,347	6,308	6,478	6,730	6,774	6,551	6,638	6,541	6,393	6,262	6,277	6,064	6,128
Kansas	8,434	8,234	8,638	8,743	9,225	9,794	9,389	8,567	7,622	7,704	8,335	9,111	8,977
Kentucky, Tennessee	2,182	2,160	2,075	2,199	2,084	2,075	2,023	1,828	1,801	1,656	1,740	1,585	1,514
Louisiana	7,279	7,369	7,719	7,301	7,620	6,995	7,029	6,852	6,814	7,119	7,042	6,956	7,697
Michigan	898	880	838	890	890	942	999	971	935	901	1,199	990	988
Minnesota								566	648	546	481	569	498
Mississippi	1,508	1,292	1,428	1,427	1,370	1,449	1,395	1,254	1,267	1,149	1,035	1,278	1,194
Montana	890	1,012	1,050	1,226	1,178	1,125	1,052	902	846	886	890	935	987
Nebraska	1,565	1,550	1,574	1,589	1,615	1,663	1,712	1,508	1,348	1,365	1,433	1,406	1,508
New Mexico	2,205	2,162	2,017	1,787	2,051	1,840	1,865	1,722	1,825	1,926	2,005	2,408	2,280
New York	212	189	205	190	195	190	171	157	172	146	199	177	175
North Dakota	237	246	323	301	261	256	248	228	256	258	257	245	326
Ohio	5,153	4,770	4,602	4,515	4,708	4,761	4,959	5,329	4,920	4,445	4,373	4,516	4,647
Oklahoma	16,836	14,490	15,297	16,405	15,965	16,760	16,507	15,680	13,325	12,930	14,227	14,020	14,549
Pennsylvania	1,669	1,424	1,186	1,137	1,129	1,169	1,113	1,220	1,212	1,238	1,266	1,170	954
Texas	69,923	68,337	68,543	71,499	70,478	68,052	64,996	60,607	60,881	59,740	61,040	62,816	63,399
Utah	529	518	456	529	619	534	534	468	483	544	546	502	595
West Virginia	403	386	375	349	394	411	458	438	464	465	433	444	422
Wyoming	9,286	9,079	8,855	8,739	8,313	9,393	8,750	8,005	7,311	6,947	7,229	8,186	8,467
Total pipeline and tank-farm stocks	167,147	161,678	163,338	166,822	166,560	164,972	161,845	152,974	147,332	144,141	147,650	151,256	152,848
Lease stocks	20,677	21,633	22,011	22,345	22,449	22,235	21,024	20,970	20,374	20,357	20,699	20,674	20,502
Grand total: 1960	257,129	252,206	257,028	260,923	266,178	261,312	257,301	242,745	234,091	231,966	232,990	239,528	239,800
1959	262,730	258,108	260,040	254,940	257,564	264,525	272,505	264,994	253,091	250,996	257,487	255,953	257,129

VALUES AND PRICE

The average value of crude oil at the well in 1960 was $2.88 per barrel—2 cents below the 1959 values. The total value of crude oil at the well was 7,419 million dollars.

With few exceptions, posted prices on crude oil remained steady all during 1960. Pennsylvania-grade crudes in the Bradford and Allegheny group increased 40 cents per barrel, and other Pennsylvania-grade crudes increased 30 cents per barrel. The posted price of Indiana-Illinois Basin and Western Kentucky crude oils were reduced 15 cents per barrel in June, but in August the Indiana-Illinois Basin crude price was restored to the January 1 level of $3.00, and the posted price on Western Kentucky crude was increased 20 cents per barrel to $3.05—5 cents above the January 1 price.

TABLE 39.—Value of crude petroleum at wells in the United States, by States

State	1959		1960 [1]	
	Total value at wells (thousand dollars)	Average value per barrel	Total value at wells (thousand dollars)	Average value per barrel
Alaska	295	$1.58	1,228	$2.20
Arkansas	72,931	2.77	80,200	2.77
California	787,812	2.55	748,716	2.46
Colorado	134,676	2.90	136,779	2.90
Illinois	229,414	2.99	233,366	2.96
Indiana	34,315	2.97	34,075	2.94
Kansas	347,870	2.91	329,020	2.90
Kentucky	76,634	2.81	60,260	2.85
Louisiana:				
Gulf Coast	1,001,979	3.16	1,091,574	3.14
Northern	143,590	3.15	146,249	3.13
Total Louisiana	1,145,569	3.16	1,237,823	3.14
Michigan	30,691	2.94	45,585	2.91
Mississippi	140,921	2.84	146,648	2.83
Montana	76,434	2.56	72,878	2.41
Nebraska	65,897	2.88	70,108	2.87
New Mexico:				
Southeastern	260,467	2.87	262,703	2.87
Northwestern	40,927	2.74	44,788	2.73
Total New Mexico	301,394	2.85	307,491	2.85
New York	8,353	4.24	8,357	4.64
North Dakota	49,907	2.80	59,495	2.71
Ohio	17,157	2.87	14,731	2.97
Oklahoma	578,423	2.92	561,481	2.92
Pennsylvania	25,872	4.20	28,474	4.55
Texas: [2]				
Gulf Coast	602,070	3.29	546,900	3.25
East Texas proper	171,811	3.20	154,932	3.16
West Texas	1,251,361	2.85	1,200,409	2.85
Other districts	867,904	2.93	864,731	2.93
Total Texas	2,893,146	2.98	2,766,972	2.96
Utah	114,283	2.86	103,021	2.74
West Virginia	7,862	3.60	9,434	4.07
Wyoming	315,125	2.50	340,158	2.51
Other States [3]	18,355	2.94	23,082	2.85
Total United States	7,473,336	2.90	7,419,382	2.88

[1] Preliminary figures.
[2] Texas Railroad Commission divisions.
[3] Alabama, Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia and Washington.

TABLE 40.—Posted price per barrel of petroleum at wells in the United States in 1960, by grade, with date of change [1]

Date	Pennsylvania Grade		Corning Grade	Western Kentucky	Indiana-Illinois Basin	Cold-water, Mich.	Oklahoma-Kansas	
	Bradford and Allegheny districts	In southwest Pennsylvania					34°–34.9°	36°–36.9°
Jan. 1	$4.40	$3.95	$2.72	$3.00	$3.00	$3.10	$2.91	$2.97
Jan. 11	4.55	4.10	-----	-----	-----	-----	-----	-----
Apr. 26	4.70	4.25	-----	-----	-----	-----	-----	-----
June 13	-----	-----	-----	2.85	-----	-----	-----	-----
June 17	-----	-----	-----	-----	2.85	-----	-----	-----
Aug. 1	4.80	-----	-----	-----	-----	-----	-----	-----
Aug. 22	-----	-----	-----	-----	3.00	-----	-----	-----
Aug. 29	-----	-----	-----	3.05	-----	-----	-----	-----

Date	Panhandle Texas (Carson, Gray, Hutchinson, and Wheeler Counties)	West Texas, 30°–30.9° (sweet)	Lea County, N. Mex. 30°–30.9° (sour)	South Texas Mirando, 24°–24.9°	East Texas	Gulf Coast			
						Conroe, Tex.	Texas		Louisiana, 30°–30.9°
							30°–30.9°	20°–20.9°	
Jan. 1	$2.80	$2.81	$2.47	$3.23	$3.25	$3.53	$3.20	$3.00	$3.10

Date	Rodessa, La., 36°–36.9°	Smackover, Ark.	Elk Basin, Wyo., 30°–30.9°	California			
				Coalinga, 32°–37.9°	Kettleman Hills, 37°–37.9°	Midway-Sunset, 19°–19.9°	Wilmington, 24°–24.9°
Jan. 1	$3.07	$2.68	$2.63	$2.96	$3.21	$2.16	$2.58
Sept. 24	-----	-----	-----	-----	-----	2.19	-----

[1] Source: Platt's Oil Price Handbook.

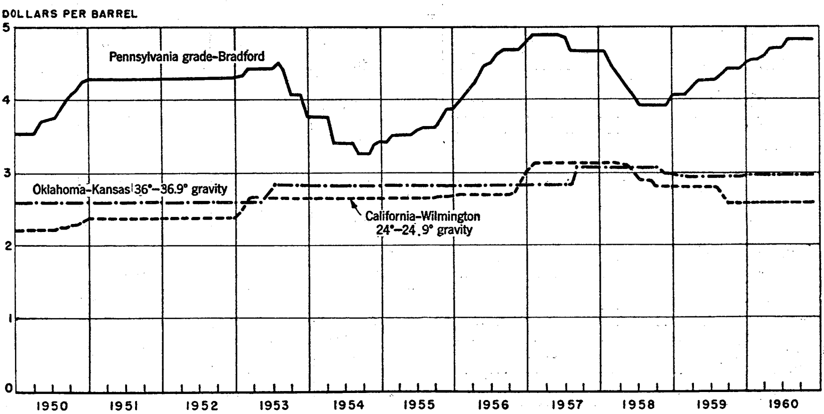

FIGURE 4.—Posted prices of selected grades of crude petroleum in the United States, 1950–60, by months.

REFINED PRODUCTS

GENERAL REVIEW

Petroleum is consumed in many finished products that must be considered individually. Competition with other fuels and economic and climatic conditions affect the consumption of these products.

Gasoline is consumed principally in highway transport, aviation, and mechanized farming. The demand for kerosine (a product defined as meeting lamp-oil specifications for color and flashpoint) has changed drastically within the past few years. This product was losing sales to electricity and liquefied petroleum, especially in rural areas, but the ability of the commercial jet aircraft to use straight kerosine as fuel has opened a vast new market. Distillate fuel oil, including light diesel oils, is used for space heating and for diesel locomotive fuel and has nearly replaced residual fuel oil and coal in railroad use. Residual fuel oil usually sells for less than crude oil at the refineries, and competes directly with natural gas and coal for heavy fuel uses. As it cannot be moved by pipeline, its distribution depends on cheap water transport and limited tankcar movement. Therefore, it cannot normally compete with coal in coal-producing areas. Liquefied gases, in competition with kerosine and light distillate fuel oil in domestic use, are gaining in importance as fuel oil in domestic use, are gaining in importance as fuel in internal combustion engines and as the initial raw material in synthesizing many petrochemicals. Jet fuels, a blend of gasoline, kerosine, and distillate fuel oils, have replaced gasoline in military combat aircraft.

The total demand for all oils in 1960 increases 2.2 percent. Domestic demand increased 2.4 percent and exports were down 4.1 percent.

Exports of petroleum in 1960 averaged 202,000 barrels daily, 9,000 barrels per day less than in 1959. Exports of all the major products declined for the year, but increased quantities of lubricating oils, wax, coke and liquefied gases were exported during 1960.

Domestic demand averaged 9,677,000 barrels daily in 1960, compared with 9,451,000 barrels daily in 1959.

Military purchases from domestic sources averaged 460,000 barrels daily in 1960, the same as in 1959.

The new supply of refined products comprises the refinery output from crude oil, the production of natural-gas liquids, a small quantity of motor benzol derived from coal, and imports of refined products from other countries. Crude runs to stills, the production of natural-gas liquids, and imports were less than demand in 1960 and resulted in a stock decrease of 30.2 million barrels.

The yield of gasoline from crude oil increased from 44.9 percent in 1959 to 45.2 percent in 1960. Kerosine yield was 0.8 percent higher for the year, reflecting the increased demand for this product as fuel in commercial jet planes.

The wholesale-price index for crude petroleum and petroleum products was 117.5 in 1960 compared with 116.6 in 1959. The average wholesale price of the four principal products, gasoline, kerosine, distillate fuel oil, and residual fuel oil, declined 0.07 cent per gallon in 1960, from 9.22 cents to 9.15 cents per gallon.

The average price of regular-grade gasoline at refineries in Oklahoma for the year 1960 was 12.47 cents per gallon. The average monthly price increased from 11.15 cents in January to 12.00 cents in April, dropped to 11.60 cents in May, increased each month through September and then remained at 13.38 cents per gallon for the rest of the year. The average prices for kerosine, distillate fuel oil, and residual fuel oil at Oklahoma refineries for 1960 were all lower than for 1959. The kerosine price declined from 10.29 cents in 1959 to 10.11 cents in 1960, distillate fuel oil was down 0.34 cent to 8.78 cents per gallon, and the residual fuel oil price of $1.89 per barrel was 8 cents per barrel below the 1959 average.

TABLE 41.—Salient statistics of the major refined petroleum products in the United States

(Thousand barrels)

	1956	1957	1958	1959 [1]	1959 [2]	1960 [2,3]
Gasoline (finished, unfinished and natural):						
Production	1,427,807	1,438,140	1,439,511	1,488,860	1,488,860	1,528,246
Imports	1,682	2,906	13,773	13,358	13,358	9,790
Exports	35,572	38,588	27,403	20,886	16,743	13,468
Stocks, end of year	187,271	196,776	186,760	187,115	187,613	194,774
Domestic demand	1,373,079	1,392,953	1,435,897	1,481,221	1,485,277	1,517,407
Kerosine:						
Production	123,480	108,929	110,008	110,662	110,662	135,772
Transfers from gasoline plants [4]	1,781	1,780	1,294	868	868	1,070
Imports	10	30	34	114	114	86
Exports	3,297	5,258	1,217	1,030	944	687
Stocks, end of year	31,420	29,200	26,040	26,817	26,856	31,445
Domestic demand	117,324	107,701	113,279	109,846	109,919	[5] 132,519
Distillate fuel oil:						
Production	665,687	668,573	631,405	678,938	678,938	667,050
Transfers from gasoline plants [4]	818	866	773	703	703	1,897
Transfers from crude	1,375	1,305	950	970	970	1,001
Imports	5,159	8,566	14,892	17,658	17,658	13,133
Exports	34,535	47,752	18,942	13,355	12,734	9,814
Stocks, end of year	133,981	149,449	125,101	151,030	151,164	138,455
Domestic demand	615,856	616,090	653,426	659,392	659,983	685,976
Residual fuel oil:						
Production	426,699	415,656	363,358	347,900	347,900	332,147
Transfers from crude	6,439	13,884	10,965	7,386	7,386	3,948
Imports	162,869	173,299	182,036	222,571	222,571	234,145
Exports	27,877	38,570	25,743	26,040	20,815	18,541
Stocks, end of year	44,491	59,959	59,508	53,261	53,501	44,870
Domestic demand	562,813	548,801	531,067	558,116	563,464	560,330
Jet fuel:						
Production	66,443	63,322	73,676	92,933	92,933	88,248
From gasoline	51,472	46,007	53,195	64,225	64,225	65,255
From kerosine	11,124	12,572	14,516	19,555	19,555	14,004
From distillate	3,847	4,743	5,965	9,153	9,153	8,989
Transfers from gasoline plants [4]	----------	----------	1,024	758	758	861
Imports	7,763	9,185	20,810	13,572	13,572	12,638
Exports	186	119	211	389	173	113
Stocks, end of year	5,322	4,749	5,871	8,741	8,758	6,456
Domestic demand	72,155	72,961	94,177	104,020	104,228	103,069
Lubricants:						
Production	59,211	55,723	51,298	56,111	56,111	59,389
Imports	----------	----------	----------	----------	----------	22
Exports:						
Grease	428	428	349	392	392	394
Oil	13,431	13,398	12,654	13,684	13,580	15,426
Stocks, end of year	10,182	10,864	9,687	8,950	8,950	9,874
Domestic demand	43,933	41,215	39,472	42,774	42,878	42,667
Wax (1 barrel=280 pounds):						
Production	5,367	5,461	5,252	5,630	5,630	5,896
Imports	----------	----------	5	21	21	6
Exports	920	1,023	911	1,034	1,031	1,333
Stocks, end of year	658	666	712	774	774	905
Domestic demand	4,340	4,430	4,300	4,555	4,558	4,438

See footnotes at end of table.

TABLE 41.—Salient statistics of the major refined petroleum products in the United States—Continued

(Thousand barrels)

	1956	1957	1958	1959 [1]	1959 [2]	1960 [2 3]
Coke (5 barrels=1 short ton):						
Production	31, 095	33, 466	37, 808	41, 117	41, 117	60, 010
Exports	6, 423	5, 225	4, 405	4, 680	4, 680	6, 856
Stocks, end of year	1, 319	2, 534	4, 818	5, 705	5, 705	4, 387
Domestic demand	24, 877	27, 026	31, 119	35, 550	35, 550	54, 472
Asphalt (5.5 barrels=1 short ton):						
Production	90, 636	85, 683	89, 380	97, 643	97, 643	98, 671
Imports	3, 606	6, 391	7, 478	6, 869	6, 869	6, 122
Exports	1, 513	1, 788	1, 364	1, 034	935	921
Stocks, end of year	9, 150	10, 463	9, 757	10, 948	10, 948	10, 142
Domestic demand	91, 347	88, 973	96, 200	102, 287	102, 386	104, 678
Road oil:						
Production	8, 027	7, 209	5, 925	6, 493	6, 493	5, 970
Stocks, end of year	501	587	417	653	653	743
Domestic demand	8, 086	7, 123	6, 095	6, 257	6, 257	5, 880
Still gas:						
Production	121, 993	125, 720	125, 951	126, 958	126, 958	129, 480
Liquefied gases (incl. ethane):						
Production [6]	51, 962	53, 437	57, 623	68, 692	68, 692	77, 578
Transfers of liquefied gas [7] from natural gasoline plants	114, 208	117, 029	123, 194	146, 415	146, 415	150, 535
Imports	(8)	(8)	(8)	(8)	(8)	1, 631
Exports	4, 274	4, 526	2, 827	2, 252	2, 252	2, 988
Stocks, end of year	1, 393	1, 913	2, 207	2, 520	2, 520	3, 623
Domestic demand	161, 535	165, 420	177, 696	212, 542	212, 542	225, 653
Miscellaneous:						
Production	12, 493	15, 816	18, 718	21, 854	21, 854	24, 358
Transfers from gasoline plants [4]	2, 347	1, 664	1, 460	1, 449	1, 449	1, 494
Imports	-----------	-----------	-----------	4	4	47
Exports	306	269	266	273	262	257
Stocks, end of year	1, 476	1, 811	2, 409	2, 281	2, 281	2, 715
Domestic demand	14, 385	16, 876	19, 314	23, 162	23, 173	25, 208
Other unfinished oils:						
Rerun (net)	4, 008	−1, 355	32, 493	25, 868	25, 868	22, 094
Transfers of other products from natural gasoline plants	(4)	(4)	(4)	(4)	(4)	(4)
Imports	2, 669	957	33, 554	23, 072	23, 072	16, 478
Stocks, end of year	66, 654	68, 966	70, 027	67, 231	67, 231	61, 615
Shortage	(15, 704)	(15, 159)	(23, 192)	(31, 509)	(31, 509)	(53, 282)

[1] Including Alaska.
[2] Including Alaska and Hawaii.
[3] Preliminary figures.
[4] Production of natural-gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[5] Includes jet fuel used in commercial aircraft: PAD districts I-IV, 23,491; PAD district V, 9,668.
[6] Liquefied refinery gases (LR gases).
[7] Liquefied petroleum gases (LP gases).
[8] Included with imports of gasoline.

TABLE 42.—Input and output of petroleum products at refineries in the United States

(Thousand barrels)

	1956	1957	1958	1959	1960 [1]
Input:					
Crude petroleum:					
Domestic	2,563,655	2,529,672	2,444,229	[2] 2,565,504	[2] 2,581,568
Foreign	341,451	360,764	345,175	352,157	370,966
Total crude petroleum	2,905,106	2,890,436	2,789,404	[2] 2,917,661	[2] 2,952,534
Natural-gas liquids	135,062	150,090	137,269	153,323	166,793
Total input	3,040,168	3,040,526	2,926,673	3,070,984	3,119,327
Output:					
Gasoline	1,396,787	1,415,335	1,411,956	1,473,430	1,510,134
Kerosine [3]	123,480	108,929	110,008	110,662	135,772
Distillate fuel oil [3]	665,687	668,573	631,405	678,938	667,050
Residual fuel oil	426,699	415,656	363,358	347,900	332,147
Jet fuel [3]	66,443	63,322	73,676	92,933	88,248
Lubricants	59,211	55,723	51,298	56,111	59,389
Wax [4]	5,367	5,461	5,252	5,630	5,896
Coke [4]	31,095	33,466	37,808	41,117	60,010
Asphalt [4]	90,636	85,683	89,380	97,643	98,671
Road oil	8,027	7,209	5,925	6,493	5,970
Still gas	121,993	125,720	125,951	126,958	129,480
Liquefied gases	51,962	53,437	57,623	68,692	77,578
Other finished products [3]	12,493	15,816	18,718	21,854	24,358
Other unfinished oils (net)	[5] −4,008	1,355	[5] −32,493	[5] −25,868	[5] −22,094
Shortage (or overage) [6]	−15,704	−15,159	−23,192	−31,509	−53,282
Total output	3,040,168	3,040,526	2,926,673	3,070,984	3,119,327

[1] Preliminary figures.
[2] New basis: Includes crude oil produced in Alaska as follows: 1959: 187,000 barrels; 1960: 558,000 barrels. On the old basis, this would be foreign crude oil. There was no production of crude oil in Hawaii.
[3] Production at natural-gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[4] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels asphalt to the short ton.
[5] Negative quantity: represents net excess of unfinished oils rerun over unfinished oil produced.
[6] Includes losses or gains in volume during processing.

TABLE 43.—Percentage yields of refined petroleum products from crude oil in the United States,[1]

Product	1951	1952 [2]	1953	1954	1955	1956	1957	1958	1959	1960 [3]
Finished products:										
Gasoline	42.4	42.4	43.9	43.8	44.0	43.4	43.8	45.2	44.9	45.2
Kerosine	5.7	5.3	4.8	4.8	4.3	4.2	3.8	3.9	3.8	4.6
Distillate fuel oil	20.0	21.2	20.7	21.3	22.0	22.9	23.1	22.4	23.1	22.4
Residual fuel oil	19.7	18.5	17.6	16.4	15.3	14.7	14.4	12.9	11.8	11.2
Jet fuel	(4)	.8	1.4	1.8	2.1	2.3	2.2	2.6	3.2	3.0
Lubricating oil	2.6	2.3	2.1	2.1	2.0	2.0	1.9	1.8	1.9	2.0
Wax	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Coke	.8	.7	.8	1.0	1.0	1.1	1.2	1.3	1.4	2.0
Asphalt	2.8	2.9	2.8	2.9	3.0	3.1	3.0	3.2	3.3	3.3
Road oil	.3	.3	.3	.3	.3	.3	.2	.2	.2	.2
Still gas	4.1	3.9	4.0	4.0	4.3	4.2	4.3	4.4	4.3	4.4
Liquefied gases	(5)	1.3	1.3	1.3	1.6	1.8	1.9	2.0	2.3	2.6
Other finished products	1.7	.3	.4	.4	.4	.4	.5	.7	.7	.8
Shortage	−.3	−.1	−.3	−.3	−.5	−.6	−.5	−.8	−1.1	−1.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Other unfinished oils added to crude in computing yields.
[2] Yields computed on the 1953 basis to show jet fuel separately.
[3] Preliminary figures.
[4] For 1951, jet fuel was included in statistics of gasoline, kerosine, and distillate fuel oil.
[5] For 1951, statistics on liquefied gases were included in "Other" finished products.

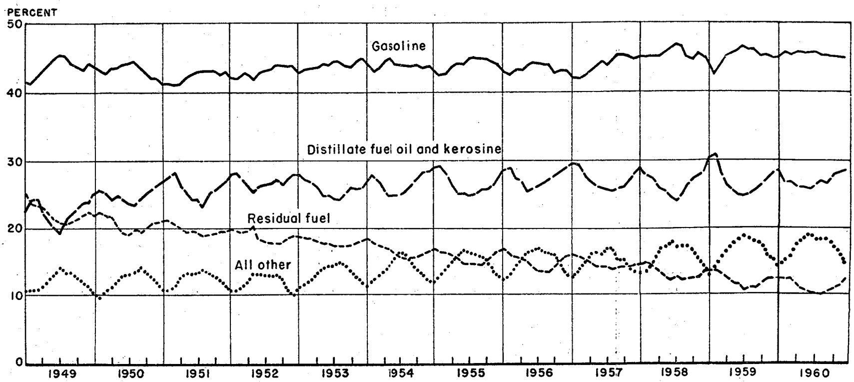

FIGURE 5.—Yields of principal products from crude runs to stills in the United States, 1949–60, by months.

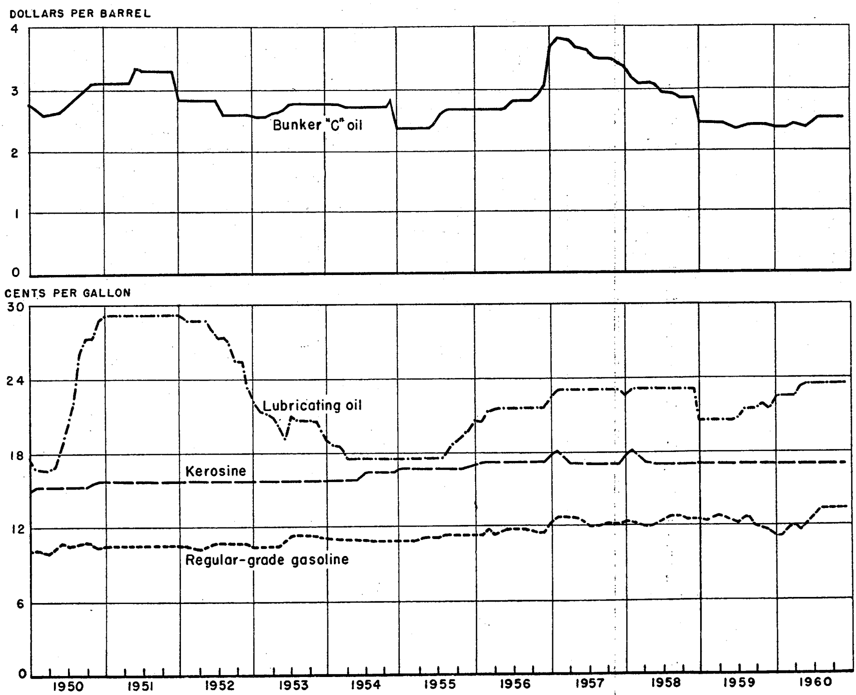

FIGURE 6.—Prices of Bunker "C" oil at New York Harbor, bright stock at Oklahoma refineries, tank-wagon kerosine at Chicago, and regular-grade gasoline at refineries in Oklahoma, 1950–60, by months.

TABLE 44.—Stocks of refined petroleum products in the United States at end of month, 1959–60

(Thousand barrels)

Product	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1959:[1]												
Gasoline [2]	199,075	210,367	218,612	210,395	205,640	196,078	185,294	181,921	174,128	174,277	181,016	187,115
Kerosine	21,090	19,725	18,688	21,003	24,597	27,364	28,328	21,221	31,562	32,396	30,701	26,817
Distillate fuel oil	96,849	84,071	80,662	86,222	102,863	120,962	140,388	164,134	174,148	181,840	171,114	151,030
Residual fuel oil	55,214	54,178	57,210	53,327	55,821	55,479	54,509	57,855	59,429	59,506	58,587	53,261
Jet fuel	6,257	6,499	7,879	7,842	7,960	7,995	7,995	8,433	7,937	8,044	8,435	8,741
Lubricating oil	9,494	9,728	9,407	9,170	8,912	8,396	8,402	8,274	8,378	8,237	8,792	8,950
Wax	714	683	684	715	741	721	701	711	709	697	720	774
Coke	4,973	5,207	5,471	5,469	5,657	5,892	6,015	5,927	5,816	5,482	5,569	5,705
Asphalt	11,252	12,726	14,270	15,235	15,351	14,228	12,853	11,409	9,986	9,579	10,224	10,948
Road oil	414	540	748	1,057	1,317	1,201	1,024	821	665	613	594	653
Liquefied refinery gases	1,846	1,948	2,090	2,286	2,510	2,615	2,803	2,863	2,966	2,991	2,741	2,520
Miscellaneous	2,339	2,212	2,509	2,349	2,469	2,282	2,303	2,369	2,196	2,285	2,336	2,281
Other unfinished oils	68,757	66,187	66,363	70,600	73,683	70,875	72,274	71,621	70,980	70,538	70,611	67,231
Total 1959	478,274	474,071	484,593	485,670	507,521	514,088	522,889	537,559	548,900	556,485	551,440	526,026
1959:[3]												
Gasoline [2]	199,674	210,848	219,105	210,951	206,175	196,562	185,743	182,405	174,580	174,823	181,556	187,613
Kerosine	21,124	19,752	18,720	21,038	24,632	27,406	28,365	31,256	31,598	32,434	30,744	26,856
Distillate fuel oil	96,974	84,179	80,767	86,343	102,964	121,070	140,480	164,228	174,255	181,963	171,252	151,164
Residual fuel oil	55,481	54,457	57,496	53,694	56,099	55,652	54,734	58,115	59,689	59,779	58,830	53,501
Jet fuel	6,266	6,508	7,889	7,851	7,969	8,004	8,006	8,444	7,950	8,071	8,455	8,758
Lubricating oil	9,494	9,728	9,407	9,170	8,912	8,396	8,402	8,274	8,378	8,237	8,792	8,950
Wax	714	683	684	715	741	721	701	711	709	697	720	774
Coke	4,973	5,207	5,471	5,469	5,657	5,892	6,015	5,927	5,816	5,482	5,569	5,705
Asphalt	11,252	12,726	14,270	15,235	15,351	14,228	12,853	11,409	9,986	9,579	10,224	10,948
Road oil	414	540	748	1,057	1,317	1,201	1,024	821	665	613	594	653
Liquefied refinery gases	1,846	1,948	2,090	2,286	2,510	2,615	2,803	2,863	2,966	2,991	2,741	2,520
Miscellaneous	2,339	2,212	2,509	2,349	2,469	2,282	2,303	2,369	2,196	2,285	2,336	2,281
Other unfinished oils	68,757	66,187	66,363	70,600	73,683	70,875	72,274	71,621	70,980	70,538	70,611	67,231
Total 1959	479,308	474,975	485,519	486,758	508,479	514,904	523,703	548,443	549,768	557,492	552,424	526,954

1960:[3] [4]												
Gasoline [2]	205,982	217,139	222,691	216,100	210,509	198,452	196,021	190,322	189,645	189,674	188,726	194,774
Kerosine	26,510	23,020	18,440	20,547	24,217	27,354	30,499	33,379	35,408	36,977	36,722	31,445
Distillate fuel oil	125,924	105,015	73,948	81,755	95,461	109,174	131,044	152,158	168,235	180,071	173,913	138,455
Residual fuel oil	49,306	45,775	40,503	39,285	39,628	41,074	43,848	47,177	50,136	50,003	49,525	44,870
Jet fuel	6,846	7,041	6,386	6,556	6,810	6,753	6,892	7,343	6,431	6,034	6,020	6,456
Lubricating oil	9,365	9,588	9,637	9,665	9,404	9,068	9,032	8,942	9,149	9,194	9,463	9,874
Wax	789	799	782	782	814	775	800	820	768	878	892	905
Coke	5,813	5,829	5,954	5,981	5,888	5,834	5,995	6,010	6,039	5,968	5,869	4,387
Asphalt	12,838	14,120	15,266	16,830	17,037	15,760	14,259	11,284	9,110	8,141	8,593	10,142
Road oil	661	785	878	1,166	1,425	1,435	1,338	956	701	641	730	743
Liquefied refinery gases	2,213	2,180	2,097	2,325	2,544	2,781	3,129	3,318	3,473	3,486	3,651	3,623
Miscellaneous	2,579	2,114	2,038	1,980	2,188	2,021	2,403	2,115	2,122	2,133	2,582	2,715
Other unfinished oils	67,427	69,039	67,283	68,988	73,023	72,352	73,261	71,137	67,801	69,121	66,548	61,615
Total 1960	516,253	502,453	465,903	471,960	488,948	492,833	518,521	534,961	549,018	562,321	553,234	510,004

[1] Includes stocks in Alaska.
[2] Includes unfinished gasoline.
[3] Includes stocks located at bulk terminals in Alaska and Hawaii; for details see tables 4 and 5, respectively.
[4] Preliminary figures.

TABLE 45.—Input and output of petroleum products at refineries in the United States, 1959–60, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959:													
Input:													
Crude petroleum	255,124	227,562	254,422	235,982	244,789	239,607	244,316	250,508	236,326	237,066	239,517	252,442	2,917,661
Natural-gas liquids	11,941	11,114	12,884	11,882	12,338	12,602	12,989	13,262	12,735	13,733	13,644	14,199	153,323
Total input	267,065	238,676	267,306	247,864	257,127	252,209	257,305	263,770	249,061	250,799	253,161	266,641	3,070,984
Output:													
Gasoline [1]	125,782	110,291	124,944	116,551	122,782	123,876	126,352	129,144	122,167	120,910	121,856	128,775	1,473,430
Kerosine [2]	12,978	11,686	9,484	8,269	7,574	7,314	6,967	7,264	8,305	8,886	9,992	11,943	110,662
Distillate fuel oil [2]	66,124	60,458	61,610	52,181	54,295	53,745	53,279	55,921	52,355	53,816	55,044	60,110	678,938
Residual fuel oil	34,622	31,493	32,569	28,104	27,874	27,448	25,514	27,393	25,581	26,949	29,147	31,206	347,900
Jet fuel [2]	6,112	6,218	7,958	7,154	7,060	7,331	7,974	9,044	8,199	8,788	8,186	8,909	92,933
Lubricating oil	4,360	3,941	4,652	4,751	4,754	4,615	4,958	4,593	4,867	4,934	4,718	4,968	56,111
Wax [3]	499	408	466	506	473	466	430	446	469	454	465	548	5,630
Coke [3]	3,413	3,182	3,679	3,083	3,466	3,620	3,314	3,349	3,425	3,415	3,360	3,811	41,117
Asphalt [3]	4,510	4,379	6,769	7,674	9,281	10,582	11,515	11,406	10,655	9,424	6,626	4,822	97,643
Road oil	62	170	310	523	752	987	1,324	1,044	623	334	164	200	6,493
Still gas	10,256	9,808	10,719	9,915	11,313	11,213	11,618	11,424	10,360	10,142	9,610	10,580	126,958
Liquefied refinery gases	5,228	5,430	6,210	5,931	5,864	5,731	5,752	5,674	5,460	5,634	5,666	6,112	68,692
Miscellaneous [2]	1,818	1,415	1,759	1,782	2,052	1,947	2,009	1,637	1,780	1,812	1,910	1,933	21,854
Other unfinished oils (net)	[4] −5,951	[4] −8,365	[4] −1,694	3,539	2,065	[4] −4,419	[4] −625	[4] −2,040	[4] −1,883	[4] −1,521	[4] −720	[4] −4,254	[4] −25,868
Shortage or (overage)	(2,748)	(1,838)	(2,129)	(2,099)	(2,478)	(2,247)	(3,076)	(2,529)	(3,302)	(3,178)	(2,863)	(3,022)	(31,509)
Total output	267,065	238,676	267,306	247,864	257,127	252,209	257,305	263,770	249,061	250,799	253,161	266,641	3,070,984
1960: [5]													
Input:													
Crude petroleum	256,659	233,880	245,423	238,809	246,847	243,773	257,522	255,748	242,999	245,157	236,789	248,928	2,952,534
Natural-gas liquids	14,063	12,704	13,347	12,878	13,085	12,926	13,805	14,237	14,202	15,000	14,812	15,734	166,793
Total input	270,722	246,584	258,770	251,687	259,932	256,699	271,327	269,985	257,201	260,157	251,601	264,662	3,119,327

Output:													
Gasoline [1]	129,694	119,455	125,159	121,395	123,659	124,800	131,522	131,128	125,980	125,035	122,659	129,648	1,510,134
Kerosine [2]	13,547	10,408	11,353	9,745	9,853	9,759	11,164	11,397	10,776	11,993	12,401	13,376	135,772
Distillate fuel oil [2]	59,874	51,877	55,690	52,300	53,841	53,338	56,773	58,081	54,928	56,262	54,877	59,209	667,050
Residual fuel oil	32,452	28,938	31,065	26,410	26,072	25,297	26,265	26,125	25,779	25,755	27,116	30,873	332,147
Jet fuel [2]	7,250	7,314	7,272	7,437	7,338	7,894	7,528	7,796	6,961	6,898	7,291	7,269	88,248
Lubricating oil	4,895	4,614	5,027	5,052	4,953	4,921	5,232	4,689	4,944	4,907	5,094	5,061	59,389
Wax [3]	456	479	511	467	512	462	456	500	453	615	514	471	5,896
Coke [3]	3,839	3,531	3,993	4,047	4,146	5,210	5,662	6,252	5,829	5,765	5,726	6,010	60,010
Asphalt [3]	4,546	4,363	4,769	7,719	9,449	11,042	11,776	12,114	11,147	9,741	6,814	5,191	98,671
Road oil	74	212	152	516	690	842	1,190	943	515	324	245	267	5,970
Still gas	10,572	10,100	10,430	10,872	11,369	11,469	11,291	11,590	10,934	10,692	9,833	10,328	129,480
Liquefied refinery gases	6,260	6,277	6,990	6,591	6,307	6,604	6,747	6,716	6,229	5,997	6,128	6,732	77,578
Miscellaneous [2]	1,966	1,512	2,224	2,225	2,292	1,825	2,092	1,692	2,066	2,072	2,164	2,228	24,358
Other unfinished oils (net)	[4] −1,067	397	[4] −3,031	181	2,835	[4] −2,044	[4] −877	[4] −3,416	[4] −4,594	[4] −428	[4] −4,021	[4] −6,029	[4] −22,094
Shortage of (overage)	(3,636)	(2,893)	(2,834)	(3,270)	(3,384)	(4,720)	(5,494)	(5,622)	(4,746)	(5,471)	(5,240)	(5,972)	(53,282)
Total output	270,722	246,584	258,770	251,687	259,932	256,699	271,327	269,985	257,201	260,157	251,601	264,662	3,119,327

[1] Includes unfinished gasoline (net).
[2] Production at natural-gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[3] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton.
[4] Negative quantity; represents net excess of unfinished oils rerun over unfinished oil produced.
[5] Preliminary figures.

TABLE 46.—Input and output of petroleum products at refineries in the United States, 1959–60, by districts

(Thousand barrels)

	East Coast	Appalachian No. 1	Appalachian No. 2	Indiana, Illinois, Kentucky, etc.	Minnesota, Wisconsin, etc.	Oklahoma, Kansas, etc.	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas-Louisiana Inland, etc.	New Mexico	Rocky Mountain	West Coast	Total
1959:														
Input:														
Crude petroleum	408,618	34,977	37,440	535,707	38,022	264,586	104,012	673,746	257,714	32,091	8,804	106,038	415,906	2,917,661
Natural-gas liquids	2,238	—	103	11,982	601	15,296	27,226	49,486	15,182	3,718	928	2,685	23,878	153,323
Total input	410,856	34,977	37,543	547,689	38,623	279,882	131,238	723,232	272,896	35,809	9,732	108,723	439,784	3,070,984
Output:														
Gasoline [1]	187,417	14,743	19,377	275,006	18,285	143,820	76,547	342,495	136,244	14,688	4,728	49,156	190,924	1,473,430
Kerosine [2]	11,765	1,367	2,083	25,342	1,829	4,993	2,965	35,238	20,602	1,518	145	1,196	1,619	110,662
Distillate fuel oil [2]	125,597	7,848	6,893	115,715	9,373	67,287	17,761	169,187	61,528	7,194	1,669	22,700	66,186	678,938
Residual fuel oil	61,657	3,440	4,589	62,311	4,831	9,200	7,714	57,891	18,018	2,211	892	12,512	102,634	347,900
Jet fuel [2]	3,104	205	124	7,098	435	15,454	12,212	17,093	8,616	716	1,210	6,758	19,908	92,933
Lubricating oil	7,754	3,301	506	4,502	—	4,589	135	21,098	6,695	1,953	—	209	5,369	56,111
Wax [3]	1,910	335	64	300	—	628	41	1,120	626	—	—	68	538	5,630
Coke [5]	7,611	—	351	11,698	1,373	5,438	424	3,840	2,763	1,073	—	1,647	4,899	41,117
Asphalt [3]	20,329	1,231	2,576	17,512	1,208	10,036	5,347	7,076	3,934	4,749	510	6,833	16,302	97,643
Road oil	23	—	—	1,652	151	1,386	—	16	10	18	—	1,925	1,312	6,493
Still gas	16,648	1,813	1,984	25,821	1,224	10,568	5,203	24,767	7,468	1,215	187	4,543	25,517	126,958
Liquefied refinery gases	8,875	383	127	6,046	675	5,686	2,884	19,963	14,905	780	53	1,223	7,092	68,692
Miscellaneous [2]	3,356	523	27	1,901	65	1,210	688	5,752	3,289	58	30	416	4,539	21,854
Other unfinished oils (net)	[4] −39,189	[4] −376	[4] −287	[4] −545	[4] −49	577	[4] −1,640	24,602	[4] −3,447	[4] −785	2	338	[4] −5,069	[4] −25,868
Shortage or (overage)	(6,001)	164	(871)	(6,670)	(777)	(990)	957	(6,906)	(8,355)	421	306	(801)	(1,986)	(31,509)
Total output	410,856	34,977	37,543	547,689	38,623	279,882	131,238	723,232	272,896	35,809	9,732	108,723	439,784	3,070,984
1960: [6]														
Input:														
Crude petroleum	410,144	35,151	36,680	538,458	44,489	264,330	106,936	694,839	242,306	39,403	8,490	104,437	426,871	2,952,534
Natural-gas liquids	1,851	5	71	14,773	767	16,320	28,518	48,515	17,007	8,536	983	3,252	26,195	166,793
Total input	411,995	35,156	36,751	553,231	45,256	280,650	135,454	743,354	259,313	47,939	9,473	107,689	453,066	3,119,327

Output:														
Gasoline [1]	188, 358	14, 592	18, 862	278, 836	21, 066	146, 579	80, 084	357, 728	130, 454	23, 900	4, 536	49, 641	195, 498	1, 510, 134
Kerosine [2]	12, 893	1, 288	1, 907	27, 143	1, 958	5, 155	3, 392	44, 455	22, 172	2, 078	120	1, 169	12, 042	135, 772
Distillate fuel oil [2]	120, 615	7, 936	6, 892	114, 715	10. 639	65, 120	17, 801	168, 100	53. 182	8, 106	1, 521	23, 878	68, 545	667, 050
Residual fuel oil	55, 686	3, 844	4, 485	60, 369	6, 532	8. 486	7, 417	51, 212	16, 784	2, 403	881	11, 505	102, 543	332, 147
Jet fuel [2]	3, 064	94	400	7, 362	779	16, 372	12, 712	14. 748	8, 315	885	1, 368	5, 322	16, 827	88, 248
Lubricating oil	8, 642	3, 366	486	4, 861	----------	4, 754	182	22, 485	6, 409	2, 062	----------	324	5, 818	59, 389
Wax [3]	2, 025	266	58	356	----------	678	57	1, 253	607	----------	----------	82	514	5, 896
Coke [3]	10, 076	101	362	13, 747	1, 638	7, 469	1, 025	9, 068	3, 986	1, 677	28	2, 521	8, 312	60, 010
Asphalt [3]	21, 550	1, 250	2, 434	18, 825	1, 340	10, 393	4, 756	7, 782	4, 442	4, 252	488	7, 017	14, 142	98, 671
Road oil	24	----------	----------	1, 786	233	1, 058	----------	12	29	13	----------	1, 467	1, 348	5, 970
Still gas	16, 159	1, 763	2, 050	26, 380	1, 531	10, 959	5, 643	26, 113	7, 528	2, 259	223	4, 139	24, 733	120, 480
Liquefied refinery gases	9, 793	572	153	8, 189	746	6, 251	3, 324	20, 404	16, 264	908	57	1, 499	9, 418	77, 578
Miscellaneous [2]	3, 803	600	28	1, 167	62	1, 026	697	8, 722	3, 130	328	3	313	4, 479	24, 358
Other unfinished oils (net)	[4] −31, 928	[4] −331	[4] −413	[4] −421	[4] −99	[4] −1, 316	[4] −1, 946	25, 359	[4] −3, 948	[4] −581	4	164	[4] −6, 638	[4] −22, 094
Shortage or (overage)	(8, 765)	(185)	(953)	(10, 084)	(1, 169)	(2, 334)	310	(14, 087)	(10, 041)	(351)	244	(1, 352)	(4, 515)	(53, 282)
Total output	411, 995	35, 156	36, 751	553, 231	45, 256	280, 650	135, 454	743, 354	259, 313	47, 939	9, 473	107, 689	453, 066	3, 119, 327

[1] Includes unfinished gasoline (net).
[2] Production at natural gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[3] Conversion factor :280 pounds of wax to the barrel, 5.0 barrels of coke to the short ton, 5.5 barrels of asphalt to the short ton.
[4] Negative quantity; represents net excess of unfinished oils rerun over unfinished oils produced.
[5] Preliminary figures.

REFINERY CAPACITY

The total crude oil capacity as of January 1, 1961 was 10,008,073 barrels daily, an increase in installed capacity for the year of 106,649 barrels daily. The capacity of the average refinery to process crude oil increased from 31,940 barrels daily in 1959 to 32,180 barrels per day in 1961. Additional crude oil capacity under construction at the beginning of 1961 totaled 36,500 barrels daily, the smallest capacity under construction reported since 1945.

TABLE 47.—Petroleum refinery capacity in the United States, January 1, 1956–61

	Number of refineries				Crude-oil throughput capacity (barrels per day)				
						Shutdown			
	Operating	Shutdown	Total	Building	Operating	Operable	Inoperable	Total	Building
1956	294	24	318	2	8,380,801	201,835	49,754	8,632,390	267,000
1957	298	21	319	3	8,808,841	262,856	51,977	9,123,674	256,350
1958	288	30	318	2	8,939,907	418,400	49,400	9,407,707	185,265
1959	291	22	313		9,450,741	310,705	58,400	9,819,846	108,400
1960	290	20	310	2	9,543,329	299,295	58,800	9,901,424	70,947
1961	289	22	311		9,627,685	368,888	11,500	10,008,073	36,500

AVIATION GASOLINE

The demand for aviation-grade gasoline is declining rapidly as each year more commercial airlines are replacing their propeller-type aircraft with jet engine craft. Total demand for aviation gasoline declined 22.0 percent in 1960 (from 89.6 million barrels in 1959 to 69.8 million in 1960). Domestic demand in 1960 was 22.7 percent lower, and exports were 17.9 percent below the 1959 total. Refineries reported deliveries to the military of 68,000 barrels per day in 1960 compared with 75,000 barrels in 1959.

Jet type fuels are not included in aviation gasoline. The fuel used in commercial jet planes (mostly straight kerosine) is reported in another section of this chapter under kerosine and only that used by the military is reported under the section on jet fuel.

GASOLINE

The total demand for gasoline in 1960 averaged 4,183,000 barrels daily, a 1.9 percent increase over 1959. Domestic demand for the year was 4,146,000 barrels daily, and exports averaged 37,000 barrels daily. All figures for aviation gasoline and naphthas are included under total gasoline.

Production.—The total gasoline production in 1960 was 1,528.2 million barrels, of which 87.9 percent was produced from crude oil and 12.1 percent, from natural-gas liquids.

Yields.—The average gasoline yield from crude oil increased 0.3 percent in 1960, thus equaling the 1958 record high of 45.2 percent. The higher yield of light end products from crude oil is the result of additional installation of coking facilities at refineries, which crack deeper the heavy residuals to produce a greater volume of light products and the byproduct coke.

Domestic Demand.—The domestic demand for gasoline and naphtha in 1960 was 1,517.4 million barrels, a 2.2 percent gain for the year. Civilian highway use of gasoline, as calculated from data compiled by the Bureau of Public Roads totaled 1,320.1 million barrels (87.0 percent of the domestic demand), compared with 1,288.2 million barrels in 1959. Aviation gasoline represented 3.9 percent of the demand in 1960 compared with 5.2 percent for the previous year. The remainder, 137.5 million barrels, was considered as used for nonhighway motor vehicles, military motor vehicles, stationery and marine engines and losses.

Production and Consumption by States.—Table 51 shows gasoline production, consumption by PAD Districts, and the interdistrict shipments which balance the supply for each district. The consumption data compiled by the American Petroleum Institute excludes special naphtha and offshore military shipments. For comparative purposes in this table, the naphtha part of gasoline production has been excluded. Because no breakdown by districts is available on the 18.1 million barrels of natural-gas liquids, which was blended with gasoline at terminal facilities away from the refineries in 1960, it has been omitted from the production figures. This roughly offsets the omission of offshore military shipments in the consumption data.

Method of Distribution.—Gasoline deliveries by pipeline totaled 712 million barrels in 1960. This represented 68 percent of the total volume transported by product pipelines. Tidewater shipments of gasoline to the Atlantic seaboard States amounted to 246 million barrels (244.7 million from the gulf coast and 1.3 million barrels from the west coast). Interdistrict barge shipments from the Gulf Coast States up the Mississippi river were 46.6 million barrels in 1960. The west coast States received 17.6 million barrels of gasoline from the other States in 1960 (2.2 million via the Panama Canal, 12.7 million by pipeline, and the rest by rail). Data on intradistrict shipments of gasoline is not available, but the volume is presumed to be large.

Stocks.—Stocks of finished gasoline, as reported, include those held at refineries and at bulk terminals operated by refining and pipeline companies, but do not include those held by secondary distributors, by consumers, or in military custody. The Bureau of Mines definition of a bulk-terminal installation is any storage facility operated by refining or pipeline companies, which receives its principal products by tanker, barge, or pipeline or any storage point with a combined capacity for storing gasoline, kerosine, distillate fuel oil, residual fuel oil, or jet fuels of 50,000 barrels or more, regardless of transportation means by which products are received.

There are definite normal seasonal variations in gasoline storage because of a summer peak and a winter low in gasoline demand. These stocks build up in the winter (although refinery yields are lower) and decrease sharply during the summer. This variation in stocks makes unnecessary large variations in seasonal yields of gasoline from crude oil. Distillate fuel oil is exactly reversed as demand is high in winter and low in summer.

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TABLE 48.—Salient statistics of aviation gasoline in the United States, 1959 total and 1960 [1] by months

(Thousand barrels)

Item	1960 [2]													1959 Total	
	January	February	March	April	May	June	July	August	September	October	November	December	Total	(3)	(3)
Production, by grades:															
115–145-octane	4,112	4,054	3,836	3,301	3,379	3,385	3,259	3,609	2,564	3,330	3.446	3,426	41,701	52,282	52,282
108–135-octane	87	94	117	19	22	4	52	33	20	6	----------	24	478	2,232	2,232
100–130-octane	1,977	1,692	2,028	1,765	1,716	1,459	1,445	1,978	1,530	1,716	1,328	1,370	20,004	27,028	27,028
91–98-octane	206	254	216	141	218	213	188	124	173	166	144	145	2,188	3,046	3,046
Other grades	274	139	257	286	312	440	376	449	450	338	363	353	4,037	4,136	4,136
Alkylate	3,745	3,528	3,326	3,633	3,874	3,517	4,054	3,824	4,929	3,897	3,713	4,288	46,328	34,924	34,924
Transfers out [4]	3,000	2,945	3,358	3,461	3,539	3,570	3,938	4,229	4,376	3,709	3,136	3,757	43,018	34,679	34,679
Exports	555	582	863	1,229	1,084	953	888	977	915	914	564	506	10,030	12,212	13,117
Stocks, by grades:															
115–145-octane	4,222	4,417	4,560	4,558	4,237	4,881	3,983	4,240	3,630	4,095	4,547	4,412	4,412	3,990	3,942
108–135-octane	235	264	322	258	157	91	73	53	49	39	33	37	37	243	193
100–130-octane	3,375	3,146	3,387	3,338	3,039	2,795	2,715	2,829	2,783	2,838	2,847	2,861	2,861	3,074	3,060
91–98-octane	661	735	715	622	644	644	636	580	588	600	621	602	602	654	653
Other grades	643	586	561	571	569	603	579	616	686	725	731	799	799	559	556
Alkylate	4,265	4,877	4,774	4,927	5,202	4,929	4,840	4,290	4,369	4,417	4,806	5,227	5,227	3,519	3,519
Domestic demand, all grades	5,484	5,610	5,265	4,500	5,324	4,400	5,665	5,029	4,878	4,221	4,423	4,990	59,789	77,341	76,425
Total demand, by grades:															
115–145-octane	3,870	3,828	3,680	3,297	3,687	2,706	4,138	3,299	3,143	2,848	2,974	3,500	40,970	51,999	51,992
108–135-octane	92	64	57	82	123	70	70	15	14	16	6	7	616	2,281	2,296
100–130-octane	1,662	1,907	1,752	1,797	1,972	1,669	1,504	1,832	1,564	1,630	1,306	1,335	19,930	26,917	26,903
91–98-octane	188	179	229	227	191	210	192	179	159	152	122	160	2,188	3,193	3,186
Other grades	187	195	286	275	309	399	399	404	363	292	352	279	3,740	4,017	4,019
Alkylate	40	19	124	51	126	299	250	277	550	197	227	215	2,375	1,146	1,146
Production, by districts:															
District 1	556	816	1,089	904	1,018	1,069	961	1,079	858	900	614	607	10,471	10,206	10,206
District 2	1,959	1,808	1,879	1,733	1,722	1,787	1,933	2,166	2,127	2,112	2,032	2,266	23,524	20,468	20,468
District 3	5,617	4,937	5,169	4,827	5,007	4,537	4,728	5,045	4,715	4,557	4,525	4,828	58,492	66,080	66,080
District 4	138	129	89	142	175	145	136	121	223	189	201	242	1,930	1,442	1,442
District 5	2,131	2,071	1,554	1,539	1,599	1,480	1,616	1,606	1,743	1,695	1,622	1,663	20,319	25,452	25,452
Total	10,401	9,761	9,780	9,145	9,521	9,018	9,374	10,017	9,666	9,453	8,994	9,606	114,736	123,648	123,648

Exports, by districts:															
District 1	8	1	28	27	23	59	148	77	57	34	42	126	630	364	364
District 2	17	17	13	59	12	14	11	12	9	10	8	7	189	603	603
District 3	320	400	735	877	915	784	489	801	658	773	368	223	7,343	9,523	9,523
District 4	------	------	------	------	------	------	------	------	3	2	2	2	9	------	------
District 5	210	164	87	266	134	96	240	87	188	95	144	148	1,859	1,722	2,627
Total	555	582	863	1,229	1,084	953	888	977	915	914	564	506	10,030	12,212	13,117
Stocks, by districts:															
District 1	947	1,299	1,427	1,299	1,338	1,352	1,195	1,301	1,308	1,390	1,252	1,056	1,056	1,056	1,056
District 2	2,597	2,791	2,741	2,670	2,50	2,481	2,343	2,338	2,256	2,270	2,537	2,529	2,529	2,443	2.443
District 3	6,103	6,001	6,332	6,372	5,923	6,031	5,495	5,446	5,286	5,600	6,064	6,632	6,632	4,990	4,990
District 4	366	414	399	423	490	520	530	527	596	630	683	731	731	333	333
District 5	3,388	3,520	3,420	3,510	3,597	3,559	3,[illegible]63	2,996	2,659	2,824	2,049	2,990	2,990	3,217	3,101
Total	13,401	14,025	14,319	14,274	13,848	13,943	12,826	12,608	12,105	12,714	13,585	13,938	13,938	12,039	11,923
Shipments originating in—															
District 1	240	91	451	324	347	442	335	420	357	329	349	352	4,037	4,846	4,846
District 2	772	570	793	780	777	664	855	837	882	860	557	866	9,213	9,955	9,955
District 3	3,258	3,911	3,415	3,345	4,083	2,985	3,837	3,426	3,160	2,878	3,055	2,994	40,347	52,674	52,674
District 4	89	73	90	95	98	109	107	110	84	91	78	85	1,109	1,093	1,093
District 5	1,680	1,547	1,379	1,185	1,103	1,153	1,419	1,213	1,310	977	948	1,199	15,113	20,985	20,974
Total	6,039	6,192	6,128	5,729	6,408	5,353	6,553	6,006	5,793	5,135	4,987	5,496	69,819	89,553	89,542

[1] Preliminary figures.
[2] Includes Alaska and Hawaii.
[3] Includes Alaska.
[4] Reject material used as automotive gasoline.

TABLE 49.—Salient statistics of gasoline in the United States, 1958 total and 1959–60 by months

(Thousand barrels)

	1959 [1]													1958 total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
Production:														
Finished gasoline and naptha from crude oil	114,472	97,881	110,995	106,079	110,464	110,752	113,880	117,043	109,929	106,561	108,394	114,095	1,320,545	1,272,976
Unfinished gasoline (net)	−631	1,296	1,065	−1,410	−20	522	−517	−1,161	−497	616	−182	481	−438	1,711
Natural-gas liquids used at refineries	11,941	11,114	12,884	11,882	12,338	12,602	12,989	13,262	12,735	13,733	13,644	14,199	153,323	137,269
Sold to jobbers	1,807	1,301	1,355	1,627	1,164	775	1,706	1,293	1,233	1,007	1,070	1,092	15,430	27,555
Total production	127,589	111,592	126,299	118,178	123,946	124,651	128,058	130,437	123,400	121,917	122,926	129,867	1,488,860	1,439,511
Daily average	4,116	3,985	4,074	3,939	3,998	4,155	4,131	4,208	4,113	3,933	4,098	4,189	4,079	3,944
Imports	1,174	1,381	2,363	838	417	1,367	422	534	908	830	1,489	1,635	13,358	13,773
Exports	1,699	1,514	1,379	2,216	2,081	1,724	2,004	1,555	1,741	1,717	1,414	1,842	20,886	27,403
Daily average	55	54	44	74	67	57	65	50	58	55	47	59	57	75
Stocks, end of period:														
Finished gasoline	187,472	197,468	204,648	197,841	193,106	183,022	172,755	170,543	163,247	162,780	169,701	175,319	175,319	[1] 174,770
Unfinished gasoline	11,603	12,899	13,964	12,554	12,534	13,056	12,539	11,378	10,881	11,497	11,315	11,796	11,796	12,234
Total stocks	199,075	210,367	218,612	210,395	205,640	196,078	185,294	181,921	174,128	174,277	181,016	187,115	187,115	[1] 187,004
Domestic demand	114,993	100,167	119,038	125,017	127,037	133,856	137,260	132,789	130,360	120,881	116,262	123,561	1,481,221	1,435,897
Daily average	3,709	3,577	3,840	4,167	4,098	4,462	4,428	4,284	4,345	3,899	3,875	3,986	4,058	3,934
	1959 [2]													**1958 total**
Production:														
Finished gasoline and naptha from crude oil	114,472	97,881	110,995	106,079	110,464	110,752	113,880	117,043	109,929	106,561	108,394	114,095	1,320,545	----------
Unfinished gasoline (net)	−631	1,296	1,065	−1,410	−20	522	−517	−1,161	−497	616	−182	481	−438	----------
Natural-gas liquids used at refineries	11,941	11,114	12,884	11,882	12,338	12,602	12,989	13,262	12,735	13,733	13,644	14,199	153,323	----------
Sold to jobbers	1,807	1,301	1,355	1,627	1,164	775	1,706	1,293	1,233	1,007	1,070	1,092	15,430	----------
Total production	127,589	111,592	126,299	118,178	123,946	124,651	128,058	130,437	123,400	121,917	122,926	129,867	1,488,860	----------
Daily average	4,116	3,985	4,074	3,939	3,998	4,155	4,131	4,208	4,113	3,933	4,098	4,189	4,079	----------
Imports	1,174	1,381	2,363	838	417	1,367	422	534	908	830	1,489	1,635	13,358	----------
Exports	1,329	1,276	1,150	1,795	1,731	1,325	1,690	1,070	1,485	1,283	1,094	1,515	16,743	----------
Daily average	43	46	37	60	56	44	55	35	50	41	36	49	46	----------

Stocks, end of period:														
Finished gasoline	188,071	197,949	205,141	198,397	193,641	183,506	173,204	171,027	163,699	163,326	170,241	175,817	175,817	175,181
Unfinished gasoline	11,603	12,899	13,964	12,554	12,534	13,056	12,539	11,378	10,881	11,497	11,315	11,796	11,796	12,234
Total stocks	199,674	210,848	219,105	210,951	206,175	196,562	185,743	182,405	174,580	174,823	181,556	187,613	187,613	187,415
Domestic demand	115,175	100,523	119,255	125,375	127,408	134,306	137,609	133,239	130,648	121,221	116,588	123,930	1,485,277	----------
Daily average	3,715	3,590	3,847	4,179	4,110	4,477	4,439	4,298	4,355	3,910	3,886	3,998	4,069	----------
	1960[2,3]													1959 total
Production:														
Finished gasoline and naptha from crude oil	115,020	107,398	110,735	107,864	111,636	111,505	116,686	118,192	112,327	109,999	106,554	113,616	1,341,532	1,320,545
Unfinished gasoline (net)	611	−647	1,077	653	−1,062	369	1,031	−1,301	−549	36	1,293	298	1,809	−438
Natural-gas liquids used at refineries	14,063	12,704	13,347	12,878	13,085	12,926	13,805	14,237	14,202	15,000	14,812	15,734	166,793	153,323
Sold to jobbers	645	852	1,707	2,054	1,567	2,105	1,963	1,756	1,584	1,526	1,214	1,139	18,112	15,430
Total production	130,339	120,307	126,866	123,449	125,226	126,905	133,485	132,884	127,564	126,561	123,873	130,787	1,528,246	1,488,860
Daily average	4,204	4,149	4,092	4,115	4,040	4,230	4,306	4,287	4,252	4,083	4,129	4,219	4,176	4,079
Imports	257	635	467	661	571	1,254	1,037	948	1,396	840	781	943	9,790	13,358
Exports	916	914	1,284	1,607	1,436	1,307	1,115	1,160	1,107	1,130	747	745	13,468	16,743
Daily average	30	32	41	54	46	44	36	37	37	36	25	24	37	46
Stocks, end of period:														
Finished gasoline	193,575	205,379	209,854	202,610	198,081	185,655	182,193	177,795	177,667	177,660	175,419	181,169	181,169	175,817
Unfinished gasoline	12,407	11,760	12,837	13,490	12,428	12,797	13,828	12,527	11,978	12,014	13,307	13,605	13,605	11,796
Total stocks	205,982	217,139	222,691	216,100	210,509	198,452	196,021	190,322	189,645	189,674	208,726	194,774	194,774	187,613
Domestic demand	111,311	108,871	120,497	129,094	129,952	138,909	135,838	138,371	128,530	126,242	124,855	124,937	1,517,407	1,485,277
Daily average	3,591	3,754	3,887	4,303	4,192	4,630	4,382	4,464	4,284	4,072	4,162	4,030	4,146	4,069

[1] Includes Alaska. [2] Includes Alaska and Hawaii. [3] Preliminary figures.

TABLE 50.—Production of gasoline in the United States in 1961,[1] by districts and months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Gasoline from crude oil (excludes net unfinished):													
East Coast	15,236	15,511	15,873	14,305	15,066	15,668	16,798	16,102	15,031	15,705	14,441	15,203	184,939
Appalachian No. 1	1,215	1,212	1,224	1,280	1,223	1,220	1,262	1,276	1,236	949	1,170	1,370	14,637
Appalachian No. 2	1,698	1,598	1,305	1,397	1,373	1,388	1,746	1,744	1,688	1,748	1,599	1,572	18,856
Indiana, Illinois, Kentucky, etc.	23,144	20,627	20,800	21,276	21,535	22,221	21,755	23,179	22,440	20,866	20,181	21,492	259,516
Minnesota, Wisconsin, etc.	1,795	1,515	1,677	1,638	1,754	1,796	1,764	1,786	1,569	1,636	1,566	1,787	20,283
Oklahoma, Kansas, etc.	11,223	10,572	10,257	9,020	10,256	11,201	11,208	11,454	10,729	10,001	10,340	11,487	127,748
Texas Inland	4,187	3,656	3,886	3,903	3,972	4,189	4,495	4,505	4,176	4,014	3,830	4,195	49,008
Texas Gulf Coast	24,808	23,396	24,384	24,546	25,281	24,577	25,685	25,926	24,300	24,585	23,243	24,615	295,346
Louisiana Gulf Coast	9,513	8,192	9,800	9,656	9,556	8,478	10,439	9,920	9,264	8,838	8,975	9,332	111,963
Arkansas, Louisiana Inland, etc.	1,134	1,131	1,189	1,142	1,251	1,145	1,154	1,140	1,220	1,290	1,262	1,262	14,320
New Mexico	338	298	320	278	291	315	339	319	275	214	268	319	3,574
Rocky Mountain	4,150	3,761	3,760	3,237	3,392	3,760	4,185	4,159	3,970	3,945	3,840	4,028	46,187
West Coast	14,552	13,823	14,088	13,744	13,954	12,920	13,316	14,057	13,765	13,770	13,555	14,486	166,030
Total gasoline	112,993	105,292	108,563	105,422	108,904	108,878	114,146	115,567	109,663	107,561	104,270	111,148	1,312,407
Naphtha:													
East Coast	127	103	111	80	140	146	136	118	94	100	102	63	1,320
Appalachian No. 1	41	8	2	22	4	50	34	31	44	16	29	26	307
Appalachian No. 2	4	3	3	4	2	4	3	4	4	1	2	3	37
Indiana, Illinois, Kentucky, etc.	295	387	457	419	443	309	392	330	363	387	279	316	4,377
Minnesota, Wisconsin, etc.	---	---	---	---	---	---	---	---	---	---	---	---	---
Oklahoma, Kansas, etc.	192	135	216	222	303	256	177	212	193	179	162	199	2,446
Texas Inland	32	37	52	41	44	40	31	67	59	50	39	38	530
Texas Gulf Coast	976	1,178	996	1,067	1,307	1,253	1,211	1,408	1,259	1,339	1,284	1,475	14,753
Louisiana Gulf Coast	252	178	171	219	177	236	209	115	189	203	96	35	2,080
Arkansas, Louisiana Inland, etc.	90	68	93	84	89	98	71	69	73	80	68	78	961
New Mexico	---	---	---	---	---	---	---	---	---	---	---	---	---
Rocky Mountain	18	5	27	21	8	5	40	20	11	17	17	12	201
West Coast	---	4	44	263	215	230	236	251	375	66	206	223	2,113
Total naphtha	2,027	2,106	2,172	2,442	2,732	2,627	2,540	2,625	2,664	2,438	2,284	2,468	29,125
Total gasoline and naphtha from crude	115,020	107,398	110,735	107,864	111,636	111,505	116,686	118,192	112,327	109,999	106,554	113,616	1,341,532

Unfinished gasoline (net):													
East Coast	−289	−177	177	743	−46	−59	−240	−342	23	59	366	33	248
Appalachian No. 1	−40	−37	−16	−46	−19	−36	−42	−26	−32	−14	−3	−46	−357
Appalachian No. 2	−8	−17	37	−24	−21	−6	−7	−11	−32	3	−22	6	−102
Indiana, Illinois, Kentucky, etc.	−5	1	216	194	−382	−226	757	−228	−368	−7	223	−5	170
Minnesota, Wisconsin, etc.	----	----	1	−1	----	1	−1	----	1	−1	1	15	16
Oklahoma, Kansas, etc.	10	9	51	−43	9	−9	−28	−117	74	−54	192	−29	65
Texas Inland	241	239	236	205	170	181	113	142	108	117	107	169	2,028
Texas Gulf Coast	238	−463	115	−338	−868	506	331	−478	−343	−97	421	90	−886
Louisiana Gulf Coast	−33	−20	−117	−87	−38	−3	−144	−37	−56	−54	36	−43	−596
Arkansas, Louisiana Inland, etc.	101	41	−18	−7	−61	15	−20	55	−42	−5	4	20	83
New Mexico	----	2	----	----	1	−5	−7	−7	−4	1	−2	----	−21
Rocky Mountain	−17	82	−1	−23	25	−52	−2	−38	32	−12	39	−32	1
West Coast	413	−307	396	80	168	62	321	−214	90	100	−69	120	1,160
Total unfinished gasoline (net)	611	−647	1,077	653	−1,062	369	1,031	−1,301	−549	36	1,293	298	1,809
Percentage yield of gasoline and naphtha [2]	44.9	45.7	45.0	45.5	45.3	45.5	45.5	45.1	45.1	44.8	44.8	44.7	45.2
Natural-gas liquids blended at refineries	14,063	12,704	13,347	12,878	13,085	12,926	13,805	14,237	14,202	15,000	14,812	15,734	166,793
Total refinery production:													
East Coast	15,291	15,612	16,287	15,325	15,218	15,866	16,787	16,049	15,308	16,051	15,114	15,450	188,358
Appalachian No. 1	1,219	1,185	1,210	1,256	1,208	1,234	1,254	1,281	1,248	951	1,196	1,350	14,592
Appalachian No. 2	1,694	1,588	1,352	1,386	1,361	1,398	1,760	1,751	1,660	1,752	1,579	1,581	18,862
Indiana, Illinois, Kentucky, etc.	24,850	22,309	22,768	22,975	22,765	23,230	23,986	24,473	23,620	22,483	22,067	23,310	278,836
Minnesota, Wisconsin, etc.	1,858	1,571	1,722	1,684	1,794	1,871	1,830	1,851	1,630	1,718	1,650	1,887	21,066
Oklahoma, Kansas, etc.	12,756	11,896	11,788	10,500	11,835	12,682	12,558	12,926	12,465	11,631	12,328	13,214	146,579
Texas Inland	6,543	5,954	6,558	6,381	6,607	6,707	7,179	7,180	6,931	6,782	6,437	6,825	80,084
Texas Gulf Coast	30,209	27,731	29,169	28,919	29,538	30,207	31,274	31,215	29,336	30,159	29,067	30,904	357,728
Louisiana Gulf Coast	11,225	9,657	11,120	10,998	10,799	9,878	11,870	11,522	10,915	10,556	10,761	11,153	130,454
Arkansas, Louisiana Inland, etc.	2,217	1,934	2,039	1,957	2,014	1,935	1,901	1,794	1,911	2,064	2,045	2,089	23,900
New Mexico	414	379	386	343	368	398	425	419	357	303	351	393	4,536
Rocky Mountain	4,416	4,100	4,034	3,431	3,658	3,985	4,513	4,414	4,275	4,243	4,225	4,347	49,641
West Coast	17,002	15,539	16,726	16,240	16,494	15,409	16,185	16,253	16,324	16,342	15,839	17,145	195,498
Total 1960	129,694	119,455	125,159	121,395	123,659	124,800	131,522	131,128	125,980	125,035	122,659	129,648	1,510,134
Natural-gas liquids used in other gasoline blends [3]	645	852	1,707	2,054	1,567	2,105	1,963	1,756	1,584	1,526	1,214	1,139	18,112
Total gasoline production	130,339	120,307	126,866	123,449	125,226	126,905	133,485	132,884	127,564	126,561	123,873	130,787	1,528,246

[1] Preliminary figures.
[2] Based on crude runs to stills and adjusted for net stocks of unfinished oils.
[3] This represents a net figure and includes exports.

With the exception of January, stocks of gasoline at the close of each month in 1960 exceeded historical records for the same months. Stocks at the beginning of 1960 were about the same as opening stocks for 1959, but by the end of the year they were 7.2 million barrels higher. The estimated days' supply of finished and unfinished gasoline at yearend was 52.3 days, compared with 51.8 on Dec. 31, 1959.

TABLE 51.—Consumption, production, and distribution [1] of gasoline in 1960, by PAD districts

(Millions of barrels)

	PAD DISTRICTS					
	I	II	III	IV	V	Total
Consumption [2]	512.3	532.0	195.2	44.4	211.6	1,495.5
Supply:						
Production [3]	201.4	458.3	577.8	49.5	192.2	1,479.2
Imports	8.3				1.5	9.8
Received from other Districts:						
From District I		22.5				
From District II	10.8		13.3	.3		
From District III	313.3	81.3		5.7	9.1	
From District IV		2.1			8.4	
From District V	1.2			1.1		
Total receipts	325.3	105.9	13.3	7.1	17.5	
Total supply	535.0	564.2	591.1	56.6	211.2	1,489.0
Stock change [4]	+1.4	−1.2	+5.2	+.4	−1.7	+4.1
Shipped to other districts	22.5	24.4	409.4	10.5	2.3	
Exports	.8	.5	8.9	.1	3.2	13.5
Domestic demand	510.3	540.5	167.6	45.6	207.4	1,471.4
Difference between consumption and demand	+2.0	−8.5	+27.6	−1.2	+4.2	+24.1

[1] Apparent distribution of gasoline by districts is based on actual data on tidewater and river shipments compiled by the Geological Survey, U.S. Department of the Interior. An estimate of annual interdistrict railroad shipments was computed from January-June 1960 data compiled by the Bureau of Transport Economics, Interstate Commerce Commission and records compiled by the San Francisco office of the Bureau of Mines. Interdistrict pipeline shipments are compiled by the Bureau of Mines. As information on shipments moving from PAD District II by way of the Great Lakes ports and the Ohio River to PAD District I were not available for 1960 an estimate has been made on the basis of preceding year's data.
[2] Compiled by the American Petroleum Institute.
[3] Excludes naphtha and unfinished gasoline production and gasoline blended at terminal facilities.
[4] Includes only finished gasoline stocks.

TABLE 52.—Production (refinery output) and consumption of gasoline in the United States, by States

(Thousand barrels)

	1958		1959		1960 [1]	
	Production [2]	Consumption [3]	Production [2]	Consumption [3]	Production [2]	Consumption [3]
Alabama	(4)	22,517	(4)	23,677	(4)	24,273
Alaska	-----	(5)	-----	1,924	-----	1,907
Arizona	-----	10,773	-----	11,642	-----	12,500
Arkansas	11,158	13,565	9,181	14,145	12,635	14,470
California	[6] 178,083	136,738	[6] 190,924	141,537	[6] 195,498	143,253
Colorado	5,564	16,289	6,016	16,983	6,205	17,204
Connecticut	-----	17,593	-----	18,271	-----	18,808
Delaware	(7)	4,463	(7)	4,853	(7)	4,844
District of Columbia	-----	4,716	-----	4,934	-----	4,830
Florida	-----	41,955	-----	44,754	-----	45,488
Georgia	-----	29,354	-----	30,907	(8)	31,731
Hawaii	-----	(5)	-----	4,278	(6)	5,244
Idaho	-----	6,462	-----	6,681	-----	6,760
Illinois	104,299	70,261	107,604	72,221	114,638	73,591
Indiana	69,340	40,715	72,919	42,777	70,825	43,529
Iowa	-----	27,994	-----	28,378	-----	28,837
Kansas	56,752	24,772	59,131	25,197	61,669	25,800
Kentucky	[9] 15,086	20,746	[9] 16,975	21,643	[9] 16,860	21,874
Louisiana	[4] 135,901	22,392	[4] 141,751	22,987	[4] 141,719	22,940
Maine	-----	7,636	-----	7,909	-----	8,198
Maryland	(8)	20,484	(8)	21,505	(8)	22,255
Massachusetts	[7] 22,668	32,252	[7] 27,258	33,935	[7] 25,631	34,790
Michigan	18,294	61,362	19,908	63,610	21,240	65,735
Minnesota	8,921	31,059	9,021	31,618	10,693	32,916
Mississippi	(4)	14,809	(4)	15,789	(4)	15,912
Missouri	[10] 14,993	39,291	[10] 11,099	41,271	[10] 12,276	41,864
Montana	9,518	6,966	10,452	7,302	10,539	7,513
Nebraska	(10)	14,214	(10)	14,720	(10)	14,969
Nevada	-----	3,285	-----	3,588	-----	3,793
New Hampshire	-----	4,694	-----	4,830	-----	4,986
New Jersey	59,162	45,417	61,328	47,802	66,508	48,814
New Mexico	4,442	10,573	4,728	10,295	4,536	9,637
New York	14,040	95,255	13,011	97,949	12,259	102,848
North Carolina	-----	32,587	-----	34,805	-----	35,387
North Dakota	[11] 8,160	7,646	[11] 9,264	7,280	[11] 10,373	7,942
Ohio	72,578	74,309	76,977	77,424	74,135	77,702
Oklahoma	72,775	23,991	73,590	26,008	72,634	27,025
Oregon	-----	15,376	-----	16,065	-----	16,380
Pennsylvania	94,396	75,604	93,109	77,571	90,626	78,589
Rhode Island	(7)	5,861	(7)	5,924	(7)	5,931
South Carolina	(8)	16,436	(8)	17,400	(8)	17,674
South Dakota	-----	8,163	-----	8,276	-----	8,474
Tennessee	(9)	26,392	(9)	28,279	(9)	29,075
Texas	397,935	112,030	419,042	109,275	437,812	107,938
Utah	14,573	7,782	15,068	8,203	15,541	8,520
Vermont	-----	3,006	-----	3,127	-----	3,236
Virginia	[8] 6,306	30,098	[8] 6,621	31,484	[8] 7,109	31,776
Washington	(6)	24,047	(6)	27,200	(6)	28,472
West Virginia	753	11,830	833	12,560	817	12,192
Wisconsin	(11)	30,640	(11)	31,529	(11)	32,690
Wyoming	16,259	4,036	17,620	4,262	17,356	4,405
Total	1,411,956	1,408,436	1,473,430	1,466,584	1,510,134	1,495,521

[1] Preliminary figures.
[2] Excludes gasoline blended into jet fuel at refineries.
[3] American Petroleum Institute.
[4] Alabama and Mississippi included with Louisiana.
[5] Not included before 1959.
[6] Washington and Hawaii included with California.
[7] Delaware and Rhode Island included with Massachusetts.
[8] Maryland, South Carolina, and Georgia (1960) included with Virginia.
[9] Tennessee included with Kentucky.
[10] Nebraska included with Missouri.
[11] Wisconsin included with North Dakota.

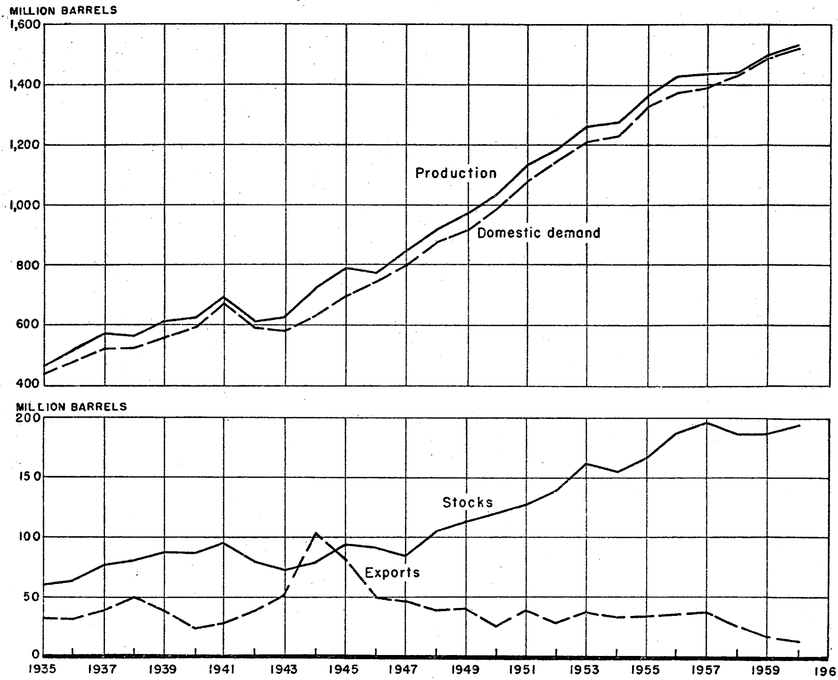

FIGURE 7.—Production, domestic demand, exports, and stocks of gasoline in the United States, 1935–60.

TABLE 53.—Transportation of petroleum products by pipeline in 1959–60, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959:													
Turned into lines:[1]													
Gasoline	55,426	48,538	59,909	58,574	61,790	62,615	64,456	63,481	60,595	59,957	56,069	57,656	709,066
Kerosine	5,827	4,923	3,980	3,283	2,489	2,655	2,469	2,997	4,003	4,872	5,149	5,893	48,540
Distillate fuel oil	27,523	22,686	19,467	15,841	13,649	14,833	15,287	15,496	16,669	18,468	21,923	27,482	229,324
Natural-gas liquids	3,844	3,205	2,957	2,761	2,845	2,733	3,070	3,125	3,164	3,805	4,230	4,677	40,416
Delivered from lines:[1]													
Gasoline	53,947	48,047	56,911	59,029	61,985	63,439	64,809	64,640	61,824	59,626	56,384	57,577	708,218
Kerosine	6,616	4,909	3,928	3,211	2,283	2,264	2,503	2,695	3,545	4,560	5,128	6,050	47,692
Distillate fuel oil	29,322	24,803	20,572	15,167	12,840	13,008	13,581	12,426	15,897	17,979	22,249	27,713	225,557
Natural-gas liquids	4,018	3,235	3,011	2,796	2,799	2,686	2,926	3,130	3,073	3,741	4,174	4,651	40,240
Shortage (or coverage):[2]													
Gasoline	(57)	(26)	(24)	41	15	1	(10)	104	62	(45)	86	(64)	83
Kerosine	110	111	89	96	75	69	77	68	77	105	139	122	1,138
Distillate fuel oil	(55)	(44)	(21)	(37)	3	(1)	3	20	22	(95)	54	----------	(151)
Natural-gas liquids	56	(17)	72	18	(2)	21	12	14	37	84	32	67	394
Stocks in lines and working tanks at end of month:													
Gasoline	23,566	24,083	27,105	26,609	26,399	25,574	25,231	23,968	22,677	23,053	22,652	22,795	22,795
Kerosine	1,728	1,631	1,594	1,570	1,701	2,023	1,912	2,146	2,527	2,734	2,616	2,337	2,337
Distillate fuel oil	11,213	9,140	8,056	8,767	9,573	11,399	13,102	16,152	16,902	17,486	17,106	16,875	16,875
Natural-gas liquids	1,704	1,691	1,565	1,512	1,560	1,586	1,718	1,699	1,753	1,733	1,757	1,716	1,716
1960:													
Turned into lines:[1]													
Gasoline	55,244	53,808	56,941	60,339	62,063	65,218	62,999	62,058	58,401	60,034	58,155	57,607	712,867
Kerosine	6,111	4,663	5,103	3,937	2,902	3,757	3,216	3,884	4,507	4,948	5,117	6,777	54,922
Distillate fuel oil	26,845	20,449	22.459	15,345	14,566	16,055	16,665	17,962	16,187	17,803	20,542	27,343	232,221
Natural-gas liquids	5,390	4,338	4,809	3,816	3,663	3,451	3,665	3,768	4,182	4,532	5,127	6,314	53,055
Delivered from lines:[1]													
Gasoline	55,275	51,240	55,908	60,133	62,538	65,172	63,057	63,411	58,869	59,989	58,406	57,958	711,956
Kerosine	5,898	4,879	5,261	3,840	2,736	3,576	3,080	3,678	3,846	4,904	5,040	6,444	53,182
Distillate fuel oil	28,424	22,995	25,540	16,082	13,310	14,252	14,773	15,144	16,159	16,995	20,666	28,513	232,853
Natural-gas liquids	4,984	4,504	4,809	4,016	3,661	3,505	3,600	3,670	3,533	4,135	4,480	5,807	50,704
Shortage (overage):[2]													
Gasoline	(103)	(18)	102	(38)	138	17	100	63	75	65	49	3	453
Kerosine	115	128	88	127	72	75	94	101	73	127	138	124	1,262
Distillate fuel oil	60	(57)	(193)	(2)	(22)	(20)	35	(23)	(1)	(13)	(38)	(48)	(322)
Natural-gas liquids	52	28	35	20	17	20	28	23	33	30	40	94	420
Stocks in lines and working tanks at end of month:													
Gasoline	22,867	25,453	26,384	26,628	26,015	26,044	25,886	24,470	23,927	23,907	23,607	23,253	23,253
Kerosine	2,435	2,091	1,845	1,815	1,909	2,015	2,057	2,162	2,750	2,667	2,606	2,815	2,815
Distillate fuel oil	15,236	12,747	9,859	9,124	10,402	12,225	14,082	16,923	16,952	17,773	17,687	16,565	16,565
Natural-gas liquids	2,070	1,876	1,841	1,621	1,606	1,532	1,569	1,644	2,260	2,627	3,234	3,647	3,647

[1] The quantities "Turned into lines" and "Delivered from lines" are on a net basis, eliminating intersystem transfers.

[2] Figures in parentheses represent overage.

TABLE 54.—Transportation of petroleum products by pipeline between PAD districts in the United States in 1959–60, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959:													
From District 1 to District 2:													
Gasoline	931	996	1,388	1,437	1,407	1,340	1,558	1,549	1,576	1,371	1,439	1,390	16,382
Kerosine	151	102	59	38	37	36	33	29	39	86	102	178	890
Distillate fuel oil	186	204	265	182	198	174	305	199	193	346	214	267	2,733
From District 2 to District 3:													
Gasoline	1,011	1,080	1,272	1,315	966	1,220	1,292	1,187	1,360	1,167	1,088	1,162	14,120
Kerosine	1	---	---	---	---	---	---	---	---	1	1	---	3
Distillate fuel oil	660	359	358	257	125	158	178	321	433	675	599	648	4,771
From District 3 to District 1:													
Gasoline	4,369	4,516	4,846	4,610	5,159	4,944	5,175	5,320	5,150	5,128	5,037	4,815	59,069
Kerosine	1,614	845	582	455	186	335	381	617	889	1,107	1,117	1,392	9,520
Distillate fuel oil	1,737	1,841	1,121	918	877	946	1,234	1,415	1,372	1,348	1,241	1,692	15,742
From District 3 to District 2:													
Gasoline	1,832	2,069	2,829	2,106	3,006	2,621	2,979	2,686	2,620	2,753	3,154	2,736	31,391
Kerosine	248	256	72	36	162	130	171	179	70	418	264	199	2,205
Distillate fuel oil	1,644	1,211	677	301	441	514	772	895	1,385	1,744	647	1,750	11,981
From District 3 to District 4:													
Gasoline	369	196	250	222	314	266	282	343	448	423	225	252	3,590
Kerosine	1	1	11	1	1	---	---	1	1	2	36	41	96
Distillate fuel oil	68	36	36	41	47	40	48	42	74	99	27	30	588
From District 3 to District 5:													
Gasoline	488	444	517	438	439	537	458	395	478	519	501	553	5,767
Kerosine	1	1	1	1	1	1	1	1	1	1	1	1	12
Distillate fuel oil	77	51	75	55	56	70	55	40	52	47	63	57	698
From District 4 to District 5:													
Gasoline	484	462	484	545	485	611	525	453	524	490	476	486	6,025
Distillate fuel oil	328	272	372	257	251	153	194	191	327	383	438	450	3,616
1960:													
From District 1 to District 2:													
Gasoline	1,593	1,579	1,597	1,779	1,872	2,002	1,822	2,226	1,839	2,059	1,931	1,963	22,262
Kerosine	126	75	109	66	53	21	33	47	104	90	116	141	981
Distillate fuel oil	299	205	324	287	234	203	269	293	298	246	329	329	3,316
From District 2 to District 1:													
Gasoline	468	391	505	452	427	385	413	448	402	433	490	411	5,225
From District 2 to District 3:													
Gasoline	1,004	928	912	994	1,018	1,272	1,075	1,039	1,088	1,008	981	1,138	12,457
Kerosine	---	---	---	---	---	---	---	---	---	---	---	---	---
Distillate fuel oil	360	230	105	159	209	169	327	464	406	468	376	552	3,825
From District 3 to District 1:													
Gasoline	4,726	4,860	4,860	4,911	5,432	5,097	5,702	5,438	5,302	5,378	5,242	5,306	62,254
Kerosine	1,163	1,032	1,054	757	315	461	628	990	855	1,064	1,143	1,214	10,676
Distillate fuel oil	1,883	1,489	1,613	1,324	1,071	957	1,213	1,597	1,508	1,067	1,310	1,674	16,706

From District 3 to District 2:													
Gasoline	2,514	2,841	3,134	3,328	3,553	3,656	3,268	3,450	3,129	3,469	3,450	3,648	39,440
Kerosine	67	153	53	109	65	186	170	117	82	80	69	255	1,406
Distillate fuel oil	1,540	537	814	764	609	832	1,107	1,032	911	793	708	823	10,470
Liquefied gases	1,401	1,140	1,329	622	461	374	491	741	942	1,254	1,248	2,787	12,790
From District 3 to District 4:													
Gasoline	385	382	415	437	435	507	556	572	520	481	488	462	5,640
Kerosine	49	55	57	43	51	45	66	62	75	89	97	104	793
Distillate fuel oil	85	57	67	74	71	55	59	64	70	66	80	90	838
Liquefied gases	137	120	97	18	15	13	13	50	38	44	86	121	752
From District 3 to District 5:													
Gasoline	543	527	630	534	566	558	542	621	498	420	548	630	6,617
Kerosine	1	1	1	1	1	1	1	1	1	16	1	2	28
Distillate fuel oil	63	67	91	83	84	111	129	100	101	94	111	97	1,131
From District 4 to District 2:													
Gasoline	95	129	91	123	195	167	190	182	141	123	113	130	1,679
Kerosine	3	4	6	4	4	3	3	4	3	3	3	3	43
Distillate fuel oil	43	35	54	89	45	58	47	43	40	53	48	40	595
From District 4 to District 5:													
Gasoline	554	480	473	522	622	519	472	552	451	539	436	486	6,106
Distillate fuel oil	448	350	379	247	271	287	261	348	344	298	304	330	3,867

TABLE 55.—Stocks of gasoline in the United States in 1960, by districts and months

(Thousand barrels)

	Jan. 31	Feb. 29	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Finished gasoline: [1]												
East Coast	40,442	44,005	43,946	42,616	45,055	42,819	43,688	43,580	42,431	43,985	43,387	40,646
Appalachian No. 1	5,740	5,795	5,838	5,775	6,154	5,890	5,986	5,751	5,712	5,402	5,165	5,459
Appalachian No. 2	3,016	3,038	2,709	2,758	2,929	2,675	2,907	2,888	2,862	3,185	2,881	2,807
Indiana, Illinois, Kentucky, etc	35,437	39,313	41,552	39,577	36,678	33,683	31,788	30,713	30,978	29,886	28,165	30,375
Minnesota, Wisconsin, North Dakota, and South Dakota	7,197	7,010	6,544	6,115	6,575	6,905	6,664	6,466	6,102	6,630	6,834	6,894
Oklahoma, Kansas, etc	18,972	20,830	21,532	19,604	18,492	16,673	16,078	16,203	16,004	15,019	14,958	16,229
Texas Inland	7,966	8,303	7,832	7,531	7,030	6,397	6,493	6,521	6,521	6,726	6,328	6,696
Texas Gulf Coast	21,910	22,935	24,242	23,416	21,348	20,549	20,550	20,568	22,156	22,014	22,048	24,797
Louisiana Gulf Coast	11,182	10,099	11,641	11,828	10,808	10,140	10,027	9,994	10,359	9,798	10,048	10,827
Arkansas, Louisiana Inland, etc	5,634	6,241	5,955	5,889	5,695	5,468	5,559	5,667	5,328	5,630	5,251	4,642
New Mexico	893	852	867	859	821	783	821	725	776	743	782	793
Other Rocky Mountain	6,666	7,528	7,795	7,325	6,681	6,018	5,501	4,863	4,797	4,950	5,339	6,109
West Coast	28,520	29,430	29,401	29,317	29,815	27,655	26,131	23,856	23,641	23,692	24,233	24,895
Total finished gasoline	193,575	205,379	209,854	202,610	198,081	185,655	182,193	177,795	177,667	177,660	175,419	[2] 181,169
Unfinished gasoline:												
East Coast	1,414	1,206	1,387	2,199	2,167	2,121	1,923	1,599	1,634	1,701	2,067	2,123
Appalachian No. 1	195	193	212	191	205	201	184	186	176	178	192	182
Appalachian No. 2	45	28	66	52	53	56	63	57	40	63	49	75
Indiana, Illinois, Kentucky, etc	2,031	1,997	2,177	2,336	1,899	1,632	2,350	2,089	1,684	1,641	1,839	1,778
Minnesota, Wisconsin, North Dakota, and South Dakota	1	1	2	1	1	2	1	1	2	1	2	17
Oklahoma, Kansas, etc	744	753	804	761	770	761	733	616	690	636	828	799
Texas Inland	277	309	323	288	252	279	233	261	275	293	232	272
Texas Gulf Coast	4,532	4,236	4,523	4,287	3,559	4,171	4,563	4,122	3,832	3,795	4,359	4,522
Louisiana Gulf Coast	308	359	288	271	285	317	228	250	223	199	260	250
Arkansas, Louisiana Inland, etc	213	254	236	228	167	182	163	218	176	172	176	196
New Mexico	9	14	14	14	15	13	11	7	4	9	9	9
Other Rocky Mountain	202	281	280	257	282	227	220	179	210	194	231	199
West Coast	2,436	2,129	2,525	2,605	2,773	2,835	3,156	2,942	3,032	3,132	3,063	3,183
Total unfinished gasoline	12,407	11,760	12,837	13,490	12,428	12,797	13,828	12,527	11,978	12,014	13,307	13,605
Total finished and unfinished gasoline:												
East Coast	41,856	45,211	45,333	44,815	47,222	44,940	45,611	45,179	44,065	45,686	45,454	42,769
Appalachian No. 1	5,935	5,988	6,050	5,966	6,359	6,091	6,170	5,937	5,888	5,580	5,357	5,641
Appalachian No. 2	3,061	3,066	2,775	2,810	2,982	2,731	2,970	2,945	2,902	3,248	2,930	2,882
Indiana, Illinois, Kentucky, etc	37,468	41,310	43,729	41,913	38,577	35,315	34,138	32,802	32,662	31,527	30,004	32,153
Minnesota, Wisconsin, North Dakota, and South Dakota	7,198	7,011	6,546	6,116	6,576	6,907	6,665	6,467	6,104	6,631	6,836	6,911
Oklahoma, Kansas, etc	19,716	21,583	22,336	20,365	19,262	17,434	16,811	16,819	16,694	15,655	15,786	17,028

Texas Inland	8,243	8,612	8,155	7,819	7,282	6,676	6,726	6,782	6,796	7,019	6,560	6,968
Texas Gulf	26,442	27,171	28,765	27,703	24,907	24,720	25,113	24,690	25,988	25,809	26,407	29,319
Louisiana Gulf Coast	11,490	10,458	11,929	12,099	11,093	10,457	10,255	10,244	10,582	9,997	10,308	11,077
Arkansas, Louisiana Inland, etc	5,847	6,495	6,191	6,117	5,862	5,650	5,722	5,885	5,504	5,802	5,427	4,838
New Mexico	902	866	881	873	836	796	832	732	780	752	791	802
Other Rocky Mountain	6,868	7,809	8;075	7,582	6,963	6,245	5,721	5,042	5,007	5,144	5,570	6,308
West Coast	30,956	31,559	31,926	31,922	32,588	30,490	29,287	26,798	26,673	26,824	27,296	28,078
Total: 1960 [2]	205,982	217,139	222,691	216,100	210,509	198,452	196,021	190,322	189,645	189,674	188,726	194,774
1959 [3]	199,674	210,848	219,105	210,951	206,175	196,562	185,743	182,405	174,580	174,823	181,556	187,613
1959 [4]	199,075	210,367	218,612	210,395	205,640	196,078	185,294	181,921	174,128	174,277	181,016	187,115

[1] Includes stocks of finished gasoline at refineries and bulk terminals and in pipelines.
[2] Includes 5,171,000 barrels of naphtha.
[3] Includes stocks located at bulk terminals in Alaska and Hawaii.
[4] Includes stocks located at bulk terminals in Alaska.

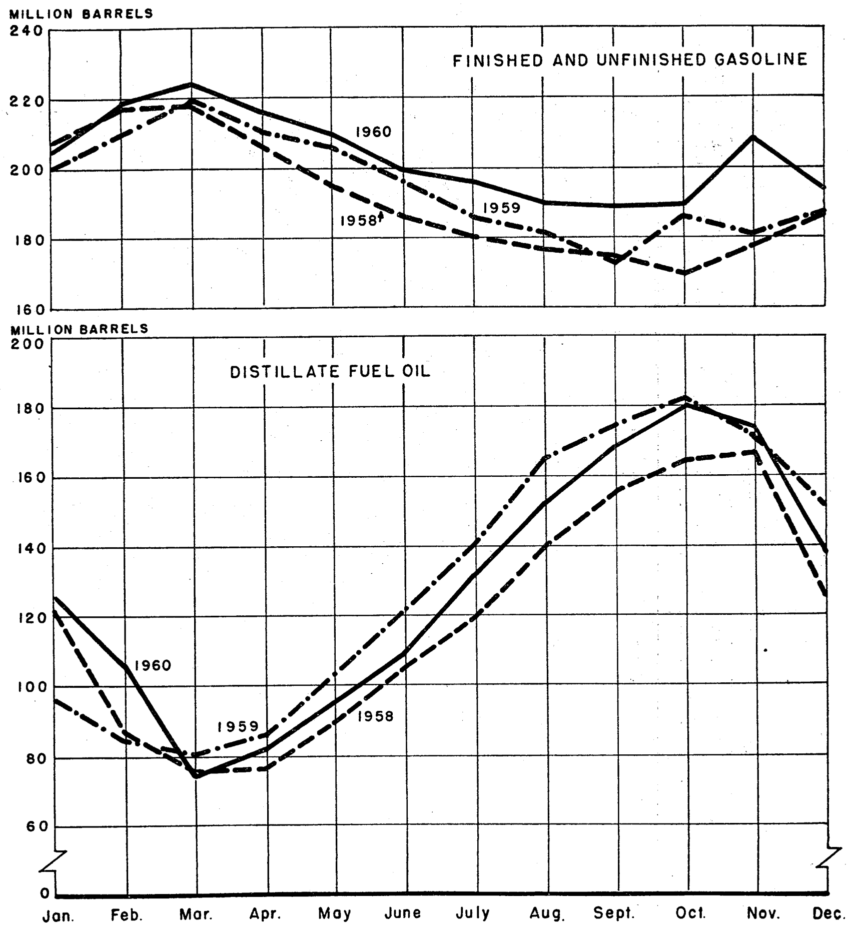

FIGURE 8.—Stocks of finished and unfinished gasoline and stocks of distillate fuel oil in the United States, 1958–60, by months.

TABLE 56.—Day's supply of gasoline on hand in the United States at end of month [1]

	1958	1959	1960 [2]		1958	1959	1960 [2]
January	58.4	54.8	54.4	July	41.8	42.7	43.6
February	60.7	54.2	55.3	August	42.9	41.3	44.0
March	53.4	51.5	51.1	September	42.2	44.0	46.2
April	49.6	50.5	51.0	October	45.0	44.5	45.3
May	45.4	45.5	45.0	November	44.8	44.8	46.6
June	42.8	43.6	44.9	December	50.0	51.8	52.3

[1] Stocks divided by daily average total demand (domestic demand plus exports) for succeeding month.
[2] Preliminary figures.

Prices.—The dealer's average net price for Regular Grade gasoline (exclusive of dealer's margin and sales tax) in 55 representative cities in the United States provides an index of wholesale gasoline prices. The average service station price (excluding taxes) decreased from 21.18 cents in 1959 to 20.99 cents in 1960. The average tax on gasoline in 1960 was 10.14 cents per gallon. This includes a 4 cent per gallon federal tax, an average state tax of 6.07 cents, and a local tax of 0.07 cent per gallon.

TABLE 57.—Average monthly prices of gasoline in the United States, 1959–60

(Cents per gallon)

Monthly average—	Jan.	Feb.	Mar.	Apr.	May	June	July
1959:							
At refineries in Oklahoma, regular, 91 octane [1]	12.48	12.38	12.57	12.75	12.63	12.32	12.08
Of 55 cities on 1st of month:							
Dealer's net (excluding tax)	15.79	15.95	15.83	16.31	16.10	16.13	16.06
Service station (including State, local, and Federal taxes)	29.51	29.89	30.06	30.32	30.17	30.26	30.44
1960:							
At refineries in Oklahoma, regular, 91 octane	11.15	11.34	11.82	12.00	11.60	12.17	12.73
Of 55 cities on 1st of month:							
Dealer's net (excluding tax)	15.72	15.46	15.61	15.37	15.82	15.74	16.14
Service station (including State, local, and Federal taxes)	30.78	30.38	30.32	30.33	30.83	30.92	31.30

Monthly average—	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year
1959:						
At refineries in Oklahoma, regular, 91 octane [1]	12.62	12.55	12.00	11.86	11.56	12.32
Of 55 cities on 1st of month:						
Dealer's net (excluding tax)	16.35	16.48	16.39	15.78	16.05	16.09
Service station (including State, local, and Federal taxes)	30.83	30.91	31.49	30.82	31.20	30.49
1960:						
At refineries in Oklahoma, regular, 91 octane	13.30	13.38	13.38	13.38	13.38	12.47
Of 55 cities on 1st of month:						
Dealer's net (excluding tax)	16.72	16.65	16.60	16.54	16.54	16.08
Service station (including State, local, and Federal taxes)	31.90	31.92	31.70	31.46	31.66	31.13

[1] 89 octane Regular-Grade gasoline before July 1.

Source: Platt's Oil Price Handbook and Platt's Oilgram Price Service.

KEROSINE

The total demand for kerosine in 1960 was 133.2 million barrels, including a domestic demand of 132.5 million barrels and exports of 0.7 million barrels. Beginning with 1960 data, all fuel used in commercial jet aircraft is included with data on kerosine. In prior years, some of this fuel, which is a straight kerosine, was included under jet fuel. Because of the change in reporting procedure, it is difficult to make an accurate comparison of current data with previous years. Sales of kerosine for jet fuel were 33.2 million barrels in 1960. In 1959, the total sales of jet fuel for use in commercial aircraft were 14.4 million barrels. Thus kerosine used in commercial jet planes more than doubled in 1960, and the demand for normal uses of kerosine decreased about 8 percent.

The average posted price of kerosine at Oklahoma refineries in 1960 was 10.11 cents, a decline of 0.18 cent for the year. The posted price on barges in New York Harbor dropped from 10.61 cents in 1959 to 10.54; the tank-wagon price in New York City increased 0.15 cent. The tank-wagon price in Chicago remained unchanged throughout the year.

Tanker rates for kerosine from the gulf coast to U.S. destinations north of Cape Hatteras increased from 34.4 cents per barrel in 1959 to 35.3 cents in 1960.

Pipeline deliveries of kerosine totaled 53.2 million barrels in 1960, compared with 47.7 million in 1959. Waterborne shipments from the gulf coast to the east coast district totaled 44.1 million barrels, a 4.6 percent increase for the year.

TABLE 58.—Salient statistics of kerosine in the United States, 1959–60, by months and districts

(Thousand barrels unless otherwise stated)

Month and district	1959 Production	1959 Yield (percent)	1959 Transfers from gasoline plants	1959 Imports	1959 Exports	1959 Stocks (end of period)	1959 Domestic demand	1960 [2] Production	1960 [2] Yield (percent)	1960 [2] Transfers from gasoline plants	1960 [2] Imports	1960 [2] Exports	1960 [2] Stocks (end of period)	1960 [2] Domestic demand	1960 [2] Shipments for commercial jet aircraft [1]
Month:															
January	12,978	5.0	117	--------	76	21,090	17,978	13,547	5.3	99	--------	106	26,510	14,753	1,898
February	11,686	5.0	77	--------	26	19,725	13,102	10,408	4.5	110	--------	93	23,020	13,915	2,078
March	9,484	3.7	90	113	42	18,688	10,682	11,353	4.5	101	--------	76	18,440	15,958	2,174
April	8,269	3.6	51	--------	33	21,003	5,972	9,745	4.1	65	--------	35	20,547	7,668	2,351
May	7,574	3.1	49	--------	23	24,597	4,006	9,853	4.0	69	--------	76	24,217	6,176	2,952
June	7,314	3.0	64	--------	71	27,364	4,540	9,759	3.9	62	--------	19	27,354	6,665	2,854
July	6,967	2.8	89	--------	41	28,328	6,051	11,164	4.3	74	--------	26	30,499	8,067	2,960
August	7,264	2.9	63	--------	77	31,221	4,357	11,397	4.4	73	--------	157	33,379	8,433	3,020
September	8,305	3.5	51	1	155	31,562	7,861	10,776	4.3	106	18	7	35,408	8,864	3,159
October	8,886	3.7	47	--------	47	32,396	8,052	11,993	4.9	69	--------	18	36,977	10,475	3,272
November	9,992	4.1	74	--------	52	30,701	11,709	12,401	5.1	92	39	11	36,722	12,776	3,257
December	11,943	4.7	96	--------	387	[3] 26,817	15,536	13,376	5.2	150	29	63	31,445	18,769	3,184
Total	110,662	3.8	868	114	1,030	[3] 26,817	109,846	135,772	4.6	1,070	86	687	31,445	132,519	33,159
District:															
East Coast	11,765	2.6	--------	114		11,520		12,893	2.9			69	12,102		
Appalachian No. 1	1,367	3.9	--------			702		1,288	3.6	--------	86		743		
Appalachian No. 2	2,083	5.5	--------	--------		385		1,907	5.1	--------			444		
Indiana, Illinois, Kentucky, etc.	25,342	4.7	--------	--------		5,716		27,143	5.0	--------	--------	49	6,256		
Minnesota, Wisconsin, North Dakota, etc.	1,829	4.8	--------	--------		1,122		1,958	4.4	--------	--------		1,206		
Oklahoma, Kansas, etc.	4,993	1.8	--------	--------		1,227		5,155	1.9	--------	--------		1,304		
Texas Inland	2,965	2.8	404	--------	(4)	481	(4)	3,392	3.1	498	--------		592	(4)	23,491
Texas Gulf Coast	35,238	5.4	166	--------		2,657		44,455	6.6	205	--------		3,358		
Louisiana Gulf Coast	20,602	7.9	108	--------		1,763		22,172	9.0	133	--------	448	2,228		
Arkansas, Louisiana Inland, etc.	1,518	4.6	169	--------		528		2,078	5.2	208	--------		1,219		
New Mexico	145	1.6	21	--------		60		120	1.4	26	--------	--------	46		
Rocky Mountain	1,196	1.1	--------	--------		264		1,169	1.1	--------	--------		318		
West Coast	1,619	.4	--------	--------		392		12,042	2.8	--------	--------	121	1,629		9,668
Total	110,662	3.8	868	114	1,030	[3] 26,817	109,846	135,772	4.6	1,070	86	687	31,445	132,519	33,159

[1] Included in total demand for kerosine for 1960. Comparable figures for 1959 are not available.

[2] Preliminary data. Data for 1960 includes Hawaii; details of Hawaii for 1959 are in table 5.

[3] For comparison with 1960—includes 867,000 barrels of commercial jet fuel stocks, which were transferred to kerosine from jet fuel.

[4] Not available.

TABLE 59.—Sales of kerosine in the United States, 1959–60, by PAD districts, States, and uses

(Thousand barrels)

District and State	Sold as range oil		Tractor fuel		All other uses		Total	
	1959	1960	1959	1960	1959	1960	1959	1960
District 1:								
Connecticut	2,371	1,624	21	--------	545	286	2,937	1,910
Delaware	905	922	6	6	56	36	967	964
District of Columbia	123	134	1	3	15	24	139	161
Florida	3,798	3,360	26	24	714	571	4,538	3,955
Georgia	1,104	1,001	163	130	537	420	1,804	1,551
Maine	2,634	2,218	16	10	296	62	2,946	2,290
Maryland	2,556	2,327	26	30	145	83	2,727	2,440
Massachusetts	5,486	5,409	27	3	230	295	5,743	5,707
New Hampshire	939	831	5	7	33	3	977	841
New Jersey	2,730	2,109	27	1	514	353	3,271	2,463
New York	5,555	4,833	60	25	692	434	6,307	5,292
North Carolina	10,888	10,825	13	24	1,816	1,219	12,717	12,068
Pennsylvania	3,250	3,134	202	34	730	333	4,182	3,501
Rhode Island	1,106	869	27	13	40	2	1,173	884
South Carolina	3,815	3,718	11	18	972	744	4,798	4,480
Vermont	916	803	--------	1	59	13	975	817
Virginia	5,196	4,844	31	23	282	162	5,509	5,029
West Virginia	197	163	3	3	146	109	346	275
Total	53,569	49,124	665	355	7,822	5,149	62,056	54,628
District 2:								
Illinois	3,234	3,563	70	26	2,242	1,770	5,546	5,359
Indiana	3,872	3,785	5	--------	354	107	4,231	3,892
Iowa	2,552	2,390	10	22	187	170	2,749	2,582
Kansas	485	395	36	29	250	271	771	695
Kentucky	1,208	1,207	47	5	495	370	1,750	1,582
Michigan	6,596	2,790	64	5	831	1,269	7,491	4,064
Minnesota	2,204	2,320	18	23	264	222	2,486	2,565
Missouri	2,261	1,802	41	27	435	254	2,737	2,083
Nebraska	563	479	20	14	150	183	733	676
North Dakota	921	858	5	2	43	42	969	902
Ohio	2,181	2,768	52	25	1,096	1,155	3,329	3,948
Oklahoma	150	199	51	44	251	187	452	430
South Dakota	939	901	--------	8	60	64	999	973
Tennessee	1,307	1,287	33	50	1,168	1,282	2,508	2,619
Wisconsin	2,623	2,168	5	3	1,086	787	3,714	2,958
Total	31,096	26,912	457	283	8,912	8,133	40,465	35,328
District 3:								
Alabama	263	595	12	68	135	381	410	1,044
Arkansas	70	209	43	99	140	256	253	564
Louisiana	47	235	32	139	346	551	425	925
Mississippi	21	68	15	31	139	298	175	397
New Mexico	48	235	17	33	125	216	190	484
Texas	302	743	157	288	1,417	2,354	1,876	3,385
Total	751	2,085	276	658	2,302	4,056	3,329	6,799
District 4:								
Colorado	280	165	12	10	103	101	395	276
Idaho	97	102	--------	--------	12	5	109	107
Montana	505	465	4	--------	35	11	544	476
Utah	16	16	--------	--------	62	20	78	36
Wyoming	92	43	8	--------	76	48	176	91
Total	990	791	24	10	288	185	1,302	986
District 5:								
Alaska	3	--------	--------	1	32	89	35	90
Arizona	--------	--------	--------	--------	28	64	28	64
California	81	76	--------	--------	1,074	939	1,155	1,015
Hawaii	(1)	23	(1)	--------	(1)	68	(1)	91
Nevada	--------	--------	--------	--------	4	3	4	3
Oregon	1	1	--------	--------	32	44	33	45
Washington	--------	--------	--------	--------	87	105	87	105
Total	85	100	--------	1	1,257	1,312	1,342	1,413
Total United States	86,491	79,012	1,422	1,307	20,581	18,835	108,494	99,154

[1] Not included in U.S. totals before 1960.

TABLE 60.—Monthly average prices of kerosine in the United States, 1959–60, in cents per gallon

Year and grade	January	February	March	April	May	June	July
1959:							
42°–44° gravity, water-white kerosine at refineries, Oklahoma	10.76	11.13	10.99	10.77	10.47	10.03	9.90
Kerosine (and No. 1 fuel oil) at New York Harbor	11.45	11.70	11.70	11.33	11.15	10.25	10.10
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	16.30	16.30	16.30	15.80	15.50	15.20	14.70
1960:							
42°–44° gravity, water-white kerosine at refineries, Oklahoma	10.56	10.20	9.83	9.41	9.38	9.42	9.70
Kerosine (and No. 1 fuel oil) at New York Harbor	11.21	11.05	10.50	10.50	10.50	10.41	10.50
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	15.90	15.30	15.30	15.30	15.30	15.30	15.30

Year and grade	August	September	October	November	December	Average for year
1959:						
42°-44 gravity, water-white kerosine at refineries, Oklahoma	9.69	9.63	9.63	9.96	10.59	10.29
Kerosine (and No. 1 fuel oil) at New York Harbor	9.88	9.80	9.80	9.80	10.40	10.61
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	14.40	14.40	14.40	14.40	15.40	15.30
1960:						
42°–44° gravity, water-white kerosine at refineries, Oklahoma	10.30	10.56	10.56	10.56	10.89	10.11
Kerosine (and No. 1 fuel oil) at New York Harbor	10.50	10.50	10.50	10.22	10.66	10.54
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	15.30	15.60	15.60	15.30	15.90	15.45

[1] Manhattan and Queens.

Source: Platt's Oil Price Handbook.

DISTILLATE FUEL OIL

The total demand for distillate fuel oil in 1960 was 3.4 percent higher than in 1959. Domestic demand increased 26.0 million barrels to 686.0 million for the year, and exports declined from 12.7 million barrels in 1959 to 9.8 million in 1960. Domestic demand for January and February was 6.1 percent below 1959 levels, but extremely cold weather in March increased demand for the month to such an extent that the demand for the first quarter of 1960 exceeded the same period of 1959 by 4.0 percent. A similar situation occurred in the last quarter of the year when the weather for October and November was warmer than normal and December was abnormally cold. The fourth-quarter domestic demand was 4.7 percent more than in 1959.

The new supply of distillate fuel oil includes refinery output, production from natural-gas liquids plants, direct transfers from crude oil, and imports. A stock reduction of 12.7 million barrels was required in 1960 to balance the new supply with the total demand.

TABLE 61.—Salient statistics of distillate fuel oil in the United States, 1959–60, by months and districts

[Thousand barrels unless otherwise stated]

1959

Month and district	Production	Yield (percent)	Transfers from gasoline plants	Transfers from crude oil[1]	Imports	Exports	Stocks (end of month)	Domestic demand
Month:								
January	66,124	25.3	58	89	1,650	1,273	96,849	95,307
February	60,458	25.6	46	83	1,674	843	84,071	74,196
March	61,610	24.1	63	89	3,505	1,430	80,662	67,246
April	52,181	22.5	47	82	1,877	965	86,222	47,662
May	54,295	22.4	42	81	811	1,105	102,863	37,483
June	53,745	22.0	47	79	1,801	1,251	120,962	36,322
July	53,279	21.8	56	75	1,055	906	140,388	34,133
August	55,921	22.1	53	74	818	1,682	164,134	31,438
September	52,355	22.0	67	72	1,181	989	174,148	42,672
October	53,816	22.6	73	77	675	865	181,840	46,084
November	55,044	22.9	62	79	822	851	171,114	65,882
December	60,110	23.4	89	90	1,789	1,195	151,030	80,967
Total	678,938	23.1	703	970	17,658	13,355	151,030	659,392
District:								
East Coast	125,597	28.0	--------	--------	17,283		57,981	
Appalachian No. 1	7,848	22.2	--------	--------			4,182	
Appalachian No. 2	6,893	18.3	--------	--------			1,584	
Indiana, Illinois, Kentucky, etc.	115,715	21.6	--------	277	13		24,532	
Minnesota, Wisconsin, etc.	9,373	24.6	--------	27			6,852	
Oklahoma, Kansas, etc.	67,287	25.5	--------	163			11,300	
Texas Inland	17,761	16.8	342	161		(3)	1,805	(3)
Texas Gulf Coast	169,187	26.1	95	95			17,836	
Louisiana Gulf Coast	61,528	23.6	17	51	360		6,088	
Arkansas, Louisiana Inland, etc.	7,194	21.9	249	31			2,673	
New Mexico	1,669	19.0	--------	85	2		183	
Rocky Mountain	22,700	21.5	--------	80			2,492	
West Coast	66,186	15.7	--------	--------	--------		13,522	
Total	678,938	23.1	703	970	17,658	13,355	151,030	659,392

1960[2]

Month and district	Production	Yield (percent)	Transfers from gasoline plants	Transfers from crude oil[1]	Imports	Exports	Stocks (end of month)	Domestic demand
Month:								
January	59,874	23.2	92	173	1,610	789	125,924	86,200
February	51,877	22.2	69	81	1,095	981	105,015	73,050
March	55,690	22.4	71	78	1,229	998	73,948	87,137
April	52,300	21.9	73	78	1,520	779	81,755	45,385
May	53,841	22.1	77	72	1,342	1,176	95,461	40,450
June	53,338	21.7	75	70	1,148	1,163	109,174	39,755
July	56,773	22.0	64	72	796	916	131,044	34,919
August	58,081	22.4	69	79	773	751	152,158	37,137
September	54,928	22.2	238	73	1,005	484	168,235	39,683
October	56,262	22.9	348	69	897	580	180,071	45,160
November	54,877	22.8	382	74	621	556	173,913	61,556
December	59,209	23.2	339	82	1,097	641	138,455	95,544
Total	667,050	22.4	1,897	1,001	13,133	9,814	138,455	685,976
District:								
East Coast	120,615	27.3	--------	--------	11,421	282	50,870	
Appalachian No. 1	7,936	22.4	--------	--------			3,730	
Appalachian No. 2	6,892	18.6	--------	--------			1,517	
Indiana, Illinois, Kentucky, etc.	114,715	21.3	--------	241	12	1,150	23,863	
Minnesota, Wisconsin, etc.	10,639	23.9	--------	116			7,145	
Oklahoma, Kansas, etc.	65,120	24.5	--------	244			12,370	
Texas Inland	17,801	16.3	922	112			1,707	(3)
Texas Gulf Coast	168,100	25.1	256	73			12,893	
Louisiana Gulf Coast	53,182	21.6	46	32	1,298	1,508	5,568	
Arkansas, Louisiana Inland, etc.	8,106	20.3	673	16			2,737	
New Mexico	1,521	17.9	--------	69	96		161	
Rocky Mountain	23,878	22.9	--------	98		36	2,692	
West Coast	68,545	15.8	--------	--------	306	6,838	13,202	
Total	667,050	22.4	1,897	1,001	13,133	9,814	138,455	685,976

[1] Figures represent crude oil used as fuel on pipelines, which is considered part of the demand for distillate.

[2] Preliminary data. Data for 1960 includes Hawaii; for details of Hawaii for 1959 see, table 5.

[3] Not available.

The annual average of posted prices for distillate fuel oil, as shown in Platt's Oil Price Handbook, was below the 1959 level at Oklahoma refineries and in New York Harbor. Prices quoted for diesel oil for use as ships' bunkers averaged 8 cents per barrel lower in New York for the year and 15 cents per barrel lower at New Orleans, but 2 cents per barrel higher at San Pedro, California.

The tanker freight rate for No. 2 distillate fuel oil from the gulf coast to New York Harbor averaged 37.4 cents per barrel in 1960, compared with 36.1 cents in 1959.

Tidewater shipments of distillate fuel oil from the gulf coast and west coast ports totaled 175.2 million barrels in 1960—a gain of 2.9 percent over 1959. Pipeline deliveries of distillate fuel oil increased from 225.6 million barrels in 1959 to 232.9 million in 1960.

TABLE 62.—Sales of distillate fuel oil [1] in the United States, 1956–60, by uses

(Thousand barrels)

Uses	1956	1957	1958	1959	1960 [2]	Change, percent
Heating oils	359,827	360,212	399,153	401,368	422,855	5.4
Range oil (No. 1 fuel oil)	17,435	16,832	13,517	14,153	15,155	7.1
Industrial (excluding oil-company use)	44,949	43,532	37,553	33,380	34,271	2.7
Oil-company use (excluding heating oil)	10,131	10,419	7,815	8,642	8,347	−3.4
Gas and electric public utility powerplants	5,403	5,296	5,382	5,005	4,742	−5.3
Railroads	89,439	88,315	83,719	87,802	86,490	−1.5
Bunkering of vessels (including company tankers but excluding military)	18,487	20,420	18,768	19,250	18,730	−2.7
Military use (U.S. Army, Navy, Air Force and Marine Corps)	11,326	12,737	13,412	11,394	10,793	−5.3
Miscellaneous uses:						
Diesel fuel	48,870	49,684	65,186	70,527	74,562	5.7
Other distillates	9,908	9,828	9,054	7,471	7,380	−1.2
Total United States	615,775	617,275	653,559	658,992	683,325	3.7

[1] Includes diesel fuel.
[2] Includes Hawaii.

TABLE 63.—Sales of distillate fuel oil [1] in the United States, by PAD districts and States

(Thousand barrels)

District and State	1956	1957	1958	1959	1960
District 1:					
Connecticut	18,490	18,574	23,885	22,176	23,230
Delaware	3,235	3,245	2,413	2,487	2,723
District of Columbia	4,139	4,124	3,402	2,719	2,914
Florida	10,169	10,188	8,150	8,190	8,971
Georgia	4,914	4,877	4,887	4,731	5,117
Maine	6,425	6,426	6,434	7,108	7,456
Maryland	17,916	18,091	16,086	12,495	13,101
Massachusetts	35,859	35,981	47,452	47,781	51,022
New Hampshire	5,123	5,089	3,951	4,049	4,484
New Jersey	41,335	41,370	42,923	45,634	45,542
New York	72,606	72,755	85,779	79,499	81,677
North Carolina	9,279	9,312	10,406	11,544	13,353
Pennsylvania	45,734	45,698	45,322	44,029	45,668
Rhode Island	5,513	5,530	7,250	7,167	8,093
South Carolina	3,445	3,588	4,266	4,454	5,203
Vermont	1,937	1,883	2,796	2,399	2,939
Virginia	14,293	14,782	13,300	12,984	14,184
West Virginia	2,095	2,039	1,913	2,154	2,462
Total	302,507	303,552	330,615	[2] 321,600	338,139
District 2:					
Illinois	35,290	35,350	42,869	43,008	42,490
Indiana	20,441	20,482	24,099	24,500	25,596
Iowa	12,543	12,548	9,883	11,360	11,141
Kansas	6,388	6,361	4,477	5,060	4,751
Kentucky	4,476	4,548	4,978	5,800	4,833
Michigan	29,071	28,995	29,385	28,387	30,464
Minnesota	18,765	18,726	16,468	15,079	16,241
Missouri	12,306	12,418	14,274	12,700	12,830
Nebraska	5,561	5,549	3,527	3,929	4,183
North Dakota	3,740	3,726	2,976	3,632	3,775
Ohio	21,937	22,045	24,221	24,850	23,836
Oklahoma	2,454	2,470	1,754	2,603	2,631
South Dakota	3,556	3,508	2,800	2,882	2,964
Tennessee	3,767	3,652	3,226	5,037	5,268
Wisconsin	17,099	17,149	20,136	20,316	21,711
Total	197,394	197,527	205,073	[2] 209,143	212,714
District 3:					
Alabama	4,277	4,326	4,346	4,891	5,370
Arkansas	2,558	2,575	2,433	2,175	2,052
Louisiana	7,653	7,877	10,756	11,249	10,694
Mississippi	1,840	1,856	1,744	2,318	2,364
New Mexico	2,167	2,205	2,492	2,302	3,065
Texas	22,258	22,812	24,077	26,541	24,315
Total	40,753	41,651	45,848	49,476	47,860
District 4:					
Colorado	3,532	3,585	3,238	3,099	4,225
Idaho	3,837	3,834	3,938	3,734	4,055
Montana	4,219	4,209	3,642	4,474	4,877
Utah	4,235	4,256	4,655	3,478	3,841
Wyoming	3,092	2,977	3,697	3,539	3,258
Total	18,915	18,861	19,170	18,324	20,256
District 5:					
Alaska	(3)	(3)	(3)	2,618	2,616
Arizona	1,716	1,742	2,018	2,100	2,774
California	24,643	24,613	24,884	26,357	26,697
Hawaii	(4)	(4)	(4)	(4)	876
Nevada	1,748	1,679	1,656	2,051	2,428
Oregon	10,862	10,132	9,380	10,456	10,920
Washington	17,237	17,518	14,915	16,867	18,045
Total	56,206	55,684	52,853	60,449	64,356
Total United States	615,775	617,275	653,559	658,992	683,325

[1] Includes diesel fuel oil.
[2] Revised.
[3] Not included in United States totals before 1959
[4] Not included in United States totals before 1960

TABLE 64.—Monthly average prices of distillate fuel oil and diesel fuel in the United States

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1959:													
No. 2 fuel oil at refineries, Oklahoma..........cents per gallon..	9.66	10.00	9.83	9.59	9.24	8.93	8.72	8.54	8.25	8.34	8.82	9.48	9.12
No. 2 fuel oil at New York harbor cents per cents..................	11.45	11.20	11.20	10.83	10.65	9.75	9.60	9.38	9.30	9.30	9.30	9.79	10.15
Diesel oil, shore plants, New York..........cents per gallon..	11.38	11.60	11.60	11.23	11.05	10.15	10.00	9.75	9.65	9.65	9.65	10.13	10.49
Diesel oil for ships:													
New York..dollars per barrel..	4.64	4.73	4.73	4.57	4.52	4.13	4.06	3.96	3.93	3.93	3.93	4.14	4.27
New Orleans............do....	4.43	4.44	4.44	4.28	4.13	3.94	3.88	3.86	3.77	3.77	3.77	3.90	4.05
San Pedro..............do....	4.96	4.96	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.07
1960:													
No. 2 fuel oil at refineries, Oklahoma..........cents per gallon..	9.42	8.91	8.47	8.13	8.00	8.13	8.57	8.95	9.13	9.13	9.13	9.45	8.78
No. 2 fuel oil at New York Harbor..........cents per gallon..	10.21	10.05	9.50	9.50	9.50	9.41	9.35	9.35	9.38	9.45	9.58	9.61	9.57
Diesel oil, shore plants, New York..........cents per gallon..	10.57	10.35	9.85	9.85	9.85	9.69	9.55	9.55	9.63	9.85	9.57	9.98	9.86
Diesel oil for ships:													
New York..dollars per barrel..	4.32	4.28	4.14	4.14	4.14	4.14	4.14	4.14	4.19	4.27	4.14	4.28	4.19
New Orleans............do....	4.01	3.97	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.88	3.95	3.90
San Pedro..............do....	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09

Source: Platt's Oil Price Handbook.

RESIDUAL FUEL OIL

The total demand for residual fuel oil averaged 1,582,000 barrels per day in 1960, compared with 1,601,000 barrels per day in 1959. Domestic demand declined 0.6 percent, and exports were 10.9 percent lower for the year.

The supply of residual available from domestic sources in 1960 totaled 336.1 million barrels, which included a 332.1 million barrel refinery output and 3.9 million barrels of crude used directly as fuel oil. The total domestic supply in 1959 was 355.3 million barrels. The difference between the 1960 demand and the domestic supply of residual fuel oil was met by imports of 234.1 million barrels and withdrawal from stocks of 8.6 million barrels.

Most of the reduction of residual fuel oil stocks, which occurred in 1960, was in the west coast district (8.3 million barrels of the U.S. total of 8.6 million) where total demand increased 13,000 barrels daily.

Total imports of residual averaged 640,000 barrels per day in 1960, compared with 610,000 barrels daily in 1959. Imports for use as fuel averaged about 450,000 barrels daily for the year, compared with 495,000 barrels daily in 1959. Residual to be used for fuel is the only part of residual imports controlled by the Oil Import Administration. That used for bunkering ships engaged in foreign trade, used offshore by the military, or used for manufacture and reexport is not counted against the quota.

The total sales of residual fuel oil and the total domestic demand for residual shown in this chapter do not agree. The latter includes some duplicate reporting of imported residual fuel oil withdrawn from bonded storage for bunkering vessels engaged in foreign trade. It is estimated that these duplications, which occurred in PAD District I, were 11,000,000 barrels in 1960. Data on the imports of residual fuel oil used in arriving at the demand are from records compiled by the Bureau of the Census.

Shipment of residual from the gulf coast to the east coast district was 6.6 million barrels higher in 1960 and reflects the shift to using imported residual for bunkering at gulf coast ports, thus, releasing domestic residual for shipment to the east coast markets. Residual shipped from the west coast district to the east coast totaled 5.8 million barrels in 1960, compared with 5.1 million in 1959.

The average tanker rate for Bunker "C" fuel oil from the gulf coast district to destinations north of Cape Hatteras declined from 44.8 cents per barrel in 1959 to 30.5 cents per barrel in 1960.

The 1960 annual average of posted prices of No. 6 residual fuel oil at Oklahoma refineries was 8 cents per barrel less than 1959, but the posted prices for No. 5 oil at New York Harbor increased 5 cents per barrel. Posted prices on Bunker "C" oil were 9 cents per barrel higher at New Orleans, 7 cents more at New York, and 3 cents more at San Pedro, California.

TABLE 65.—Salient statistics of residual fuel oil in the United States, 1959–60, by months and districts

(Thousand barrels unless otherwise stated)

Month and district	Production	Yield (percent)	Transfers [1]		Imports	Exports	Stocks (end of month)	Domestic demand	Production	Yield (percent)	Transfers [1]		Imports	Exports	Stocks (end of month)	Domestic demand
			East of California	California							East of California	California				
	1959								1960 [2]							
Month:																
January	34,622	13.3	995	58	26,241	3,234	55,214	63,028	32,452	12.6	245	51	26,366	1,728	49,306	61,581
February	31,493	13.3	845	53	26,476	2,345	54,178	57,558	28,938	12.4	316	55	24,649	1,685	45,775	55,804
March	32,569	12.7	942	96	31,394	2,703	57,210	59,266	31,065	12.5	300	41	25,790	1,767	40,503	60,701
April	28,104	12.1	629	102	15,066	2,572	53,327	45,212	26,410	11.1	312	21	19,567	1,688	39,285	45,840
May	27,874	11.5	427	58	14,293	1,950	55,821	38,208	26,072	10.7	354	57	15,590	1,484	39,628	40,246
June	27,448	11.3	396	84	14,734	2,499	55,479	40,505	25,297	10.3	319	31	17,098	1,967	41,074	39,332
July	25,514	10.4	419	38	12,122	2,145	54,509	36,918	26,265	10.2	224	39	13,955	875	43,848	36,834
August	27,393	10.8	416	32	12,211	1,554	57,855	35,152	26,125	10.0	235	131	14,966	1,888	47,177	36,240
September	25,581	10.7	372	70	14,377	1,887	59,429	36,939	25,779	10.4	316	41	15,523	1,357	50,136	37,343
October	26,949	11.3	348	66	12,867	2,403	59,506	37,750	25,755	10.6	224	44	15,976	1,283	50,003	40,849
November	29,147	12.1	354	24	20,311	1,339	58,587	49,416	27,116	11.3	283	51	21,885	1,304	49,525	48,509
December	31,206	12.2	527	35	22,479	1,409	53,261	58,164	30,873	12.1	244	14	22,780	1,515	44,870	57,051
Total	347,900	11.8	6,670	716	222,571	26,040	53,261	558,116	332,147	11.2	3,372	576	234,145	18,541	44,870	560,330
District:																
East Coast	61,657	13.8	1,940	--------	219,341		13,092		55,686	12.6	228	--------	212,701	122	12,140	
Appalachian No. 1	3,440	9.7	--------	--------			386		3,844	10.8	--------	--------			529	
Appalachian No. 2	4,589	12.2	--------	--------			440		4,485	12.1	--------	--------			367	
Indiana, Illinois, Kentucky, etc.	62,311	11.6	1,902	--------	230		5,634		60,369	11.2	511	--------	59	878	6,053	
Minnesota, Wisconsin, etc.	4,831	12.7	65	--------			751		6,532	14.6	40	--------			582	
Oklahoma, Kansas, etc.	9,200	3.5	360	--------			1,067		8,486	3.2	360	--------			995	
Texas Inland	7,714	7.3	489	--------		([3])	2,392	([3])	7,417	6.8	429	--------			2,551	([3])
Texas Gulf Coast	57,891	8.9	615	--------			5,193		51,212	7.6	566	--------			5,184	
Louisiana Gulf Coast	18,018	6.9	751	--------	2,981		925		16,784	6.8	688	--------	14,440	3,675	1,301	
Arkansas, Louisiana Inland, etc.	2,211	6.7	216	--------			239		2,403	6.0	218	--------			155	
New Mexico	892	10.1	80	--------			31		881	10.4	80	--------			27	
Rocky Mountain	12,512	11.8	252	--------	1		1,083		11,505	11.0	252	--------	--------	2	1,002	
West Coast	102,634	24.4	--------	716	18		22,028		102,543	23.7	--------	576	6,945	13,864	13,984	
Total	347,900	11.8	6,670	716	222,571	26,040	53,261	558,116	332,147	11.2	3,372	576	234,145	18,541	44,870	560 33

[1] Represents crude oil used as fuel on leases and for general industrial purposes.
[2] Preliminary data. Data for 1960 includes Hawaii; for details of Hawaii for 1959 see table 5.
[3] Not available.

TABLE 66.—Sales of residual fuel oil [1] in the United States, 1956–60, by uses

(Thousand barrels)

	1956	1957	1958	1959	1960 [2]	Change, percent
Heating oils	87,601	81,412	105,639	111,850	125,088	11.8
Industrial (excluding oil company fuel)	177,807	166,885	143,142	167,701	157,270	−6.2
Oil-company use (excluding heating oil)	53,271	50,153	46,463	46,177	45,061	−2.4
Gas and electric public utility powerplants	73,987	76,577	76,995	82,208	85,408	3.9
Railroads	10,575	6,953	5,772	5,613	5,610	
Bunkering of vessels (including company tankers but excluding military)	117,445	123,651	106,269	102,049	94,084	−7.8
Military use (U.S. Army, Navy, Air Force, and Marine Corps)	30,546	28,962	37,428	31,415	31,724	1.0
Miscellaneous uses	10,331	9,984	9,659	7,339	6,291	−14.3
Total United States	561,563	544,577	531,367	554,352	550,536	−0.7

[1] Includes navy grade and crude oil burned as fuel.
[2] Includes Hawaii.

TABLE 67.—Sales of residual fuel oil [1] in the United States, by PAD districts and States

(Thousand barrels)

District and State	1956	1957	1958	1959	1960
District 1:					
Connecticut	13,219	12,712	17,041	15,814	14,450
Delaware	2,956	2,973	5,992	7,063	6,081
District of Columbia	2,106	2,501	2,243	2,450	2,387
Florida	34,910	36,228	37,470	33,310	28,978
Georgia	5,955	6,128	7,145	6,824	6,413
Maine	4,872	5,063	5,290	6,433	5,742
Maryland	15,770	15,364	14,974	17,385	16,490
Massachusetts	29,574	28,744	29,308	35,532	38,942
New Hampshire	2,107	2,096	2,022	2,984	2,324
New Jersey	44,587	45,136	36,841	41,422	42,791
New York	51,737	51,168	71,533	79,784	76,586
North Carolina	2,558	2,467	3,034	3,908	4,537
Pennsylvania	45,325	44,482	39,873	45,660	42,731
Rhode Island	11,303	11,114	11,127	10,350	9,502
South Carolina	4,389	4,383	4,660	4,886	4,634
Vermont	402	380	455	275	498
Virginia	17,452	17,739	21,411	17,703	17,448
West Virginia	1,317	1,321	894	1,620	1,451
Total	290,539	289,999	311,313	333,403	321,985
District 2:					
Illinois	22,571	21,375	26,926	23,689	25,893
Indiana	15,206	14,753	11,955	13,035	12,885
Iowa	1,165	1,125	869	1,088	1,021
Kansas	3,827	3,586	1,420	1,943	2,249
Kentucky	1,062	1,051	503	570	321
Michigan	16,008	15,330	9,340	13,498	11,242
Minnesota	2,987	2,955	4,963	6,399	6,363
Missouri	6,126	5,758	3,774	3,129	3,026
Nebraska	377	375	151	218	378
North Dakota	870	783	625	597	663
Ohio	19,260	18,530	9,721	11,028	11,382
Oklahoma	1,857	1,740	1,001	1,319	1,396
South Dakota	211	217	100	48	60
Tennessee	879	865	384	284	184
Wisconsin	2,290	2,201	3,458	4,167	4,275
Total	94,696	90,644	75,190	81,012	81,338

See footnotes at end of table.

TABLE 67.—Sales of residual fuel oil [1] in the United States, by PAD districts and States—Continued

(Thousand barrels)

District and State	1956	1957	1958	1959	1960
District 3:					
Alabama	4, 162	4, 203	4, 240	4, 178	4, 202
Arkansas	545	549	455	346	474
Louisiana	10, 804	11, 359	13, 411	10, 764	8, 599
Mississippi	219	232	268	435	339
New Mexico	505	438	359	107	173
Texas	37, 883	37, 859	29, 082	25, 275	22, 102
Total	54, 118	54, 640	47, 815	41, 105	35, 889
District 4:					
Colorado	1, 434	1, 369	1, 330	1, 603	1, 790
Idaho	1, 256	1, 185	210	185	201
Montana	1, 646	1, 554	1, 643	2, 006	2, 022
Utah	4, 503	4, 828	5, 077	5, 872	5, 562
Wyoming	2, 156	1, 847	2, 325	1, 842	1, 738
Total	10, 995	10, 783	10, 585	11, 508	11, 313
District 5:					
Alaska	(2)	(2)	(2)	574	695
Arizona	35	21	37	34	95
California	84, 421	79, 245	72, 232	72, 287	78, 774
Hawaii	(3)	(3)	(3)	(3)	5, 613
Nevada	383	269	195	146	202
Oregon	9, 401	7, 181	5, 253	5, 121	5, 453
Washington	16, 975	11, 795	8, 747	9, 162	9, 179
Total	111, 215	98, 511	86, 464	87, 324	100, 011
Total United States	561, 563	544, 577	531, 367	554, 352	550, 536

[1] Includes some crude oil burned as fuel.
[2] Not included in United States totals before 1959.
[3] Not included in United States totals before 1960.

TABLE 68.—Monthly average prices of residual fuel oil in the United States, 1959–60, in dollars per barrel

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1959:													
No. 6 fuel oil at refineries, Oklahoma	2.02	2.18	2.18	2.15	1.94	1.88	1.88	1.88	1.88	1.88	1.88	1.93	1.97
No. 5 fuel oil at New York Harbor	2.88	2.97	2.97	2.97	2.97	2.91	2.89	2.89	2.89	2.89	2.89	2.96	2.92
Bunker "C" for ships:													
New York	2.41	2.41	2.41	2.41	2.41	2.37	2.32	2.34	2.37	2.37	2.37	2.37	2.38
New Orleans	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
San Pedro	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
1960:													
No. 6 fuel oil at refineries, Oklahoma	1.93	1.91	1.83	1.75	1.75	1.87	1.95	1.95	1.95	1.95	1.95	1.95	1.89
No. 5 fuel oil at New York Harbor	3.00	2.97	2.91	2.91	2.91	2.91	2.98	3.02	3.02	3.02	3.02	3.02	2.97
Bunker "C" for ships:													
New York	2.37	2.37	2.37	2.42	2.40	2.37	2.46	2.52	2.52	2.52	2.52	2.52	2.45
New Orleans	2.10	2.10	2.10	2.10	2.10	2.10	2.23	2.30	2.30	2.30	2.30	2.30	2.19
San Pedro	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.11	2.20	2.20	2.20	2.13

Source: Platt's Oil Price Handbook.

LUBRICANTS

While domestic demand for lubricants was less than last year, the 1960 exports increased 13.2 percent so that total demand for the year was 2.9 percent higher.

Production for the year was 59.4 million barrels—3.3 million more than in 1959.

Posted refinery prices for all grades of lubricating oils increased during 1960. These increases ranged from 0.9 cent per gallon for some grades of lubricating oils at South Texas refineries to 4.6 cents per gallon at refineries in Pennsylvania.

JET FUEL

Beginning with 1960, jet fuel reported by the Bureau of Mines refers only to fuel used by military jet aircraft, ram-jet fuels, and petroleum-base fuels for rockets. It is a product blended from gasoline, kerosine, and distillate fuel oil. This jet fuel is used by the military or by aircraft and missile manufacturers testing equipment for the U.S. Government.

The demand for jet fuel in 1960 was 103.2 million barrels. As some fuel for commercial jet planes (straight kerosine) was included in the data for prior years, an exact comparison with current demand is difficult.

LIQUEFIED GASES (INCLUDING ETHANE)

Liquefied gases are derived from two sources. Those produced at refineries are called liquefied refinery gases to distinguish them from those extracted from natural gas, which are called liquefied petroleum gases (LPG). The liquefied petroleum gases are all saturated (that is, propane, butane, etc.). The liquefied refinery gases may contain unsaturated compounds or olefins (that is, propylene, butylene, etc.). The olefins are used as feed stock for chemical plants. The saturated gases may be used as chemical raw material or as fuel. Liquefied gases are also used in producing gasoline and are reported in this chapter as natural-gas liquids used at refineries or as gasoline. While ethane and ethylene are not defined as liquefied gases, the statistics of these products are sometimes reported with those of LPG.

Liquefied gas production was 8.4 percent higher in 1960. Natural-gasoline plants produced 344.5 million barrels, and the refinery output was 77.6 million barrels. The total demand for liquefied gases in 1960 was 418.9 million barrels, of which 184.9 million was blended into gasoline, 5.3 million was transferred to other products, and 228.7 million was for fuel and chemical uses.

More detailed information on liquefied gases may be found in the Natural-Gas Liquids Chapter.

TABLE 69.—Salient statistics of lubricants in the United States, by months and districts

(Thousand barrels unless otherwise stated)

Month and district	1959					1960 [1] [2]					
	Production	Yield (percent)	Exports	Stocks, end of period	Domestic demand	Production	Yield (percent)	Imports	Exports	Stocks, end of period	Domestic demand
By months:											
January	4,360	1.7	1,053	9,494	3,502	4,895	1.9	------	1,196	9,365	3,284
February	3,941	1.7	957	9,728	2,750	4,614	2.0	1	1,040	9,588	3,352
March	4,652	1.8	1,178	9,407	3,795	5,027	2.0	1	1,333	9,637	3,646
April	4,751	2.0	1,404	9,170	3,584	5,052	2.1	2	1,422	9,665	3,604
May	4,754	2.0	1,185	8,912	3,827	4,953	2.0	2	1,318	9,404	3,898
June	4,615	1.9	1,224	8,396	3,907	4,921	2.0	1	1,559	9,068	3,699
July	4,958	2.0	1,278	8,402	3,674	5,232	2.0	1	1,478	9,032	3,791
August	4,593	1.8	1,160	8,274	3,561	4,689	1.8	1	1,088	8,942	3,692
September	4,867	2.0	1,030	8,378	3,733	4,944	2.0	4	1,258	9,149	3,483
October	4,934	2.1	1,265	8,237	3,810	4,907	2.0	3	1,386	9,194	3,479
November	4,718	2.0	859	8,792	3,304	5,094	2.1	2	1,353	9,463	3,474
December	4,968	1.9	1,483	8,950	3,327	5,061	2.0	4	1,389	9,874	3,265
Total	56,111	1.9	14,076	8,950	42,774	59,389	2.0	22	15,820	9,874	42,667
By districts:											
East Coast	7,754	1.7		1,965		8,642	2.0	18		2,200	
Appalachian No. 1	3,301	9.3		502		3,366	9.5			558	
Appalachian No. 2	506	1.3		34		486	1.3			51	
Indiana, Illinois, Kentucky, etc.	4,502	.8		1,392		4,861	.9	------		1,403	
Oklahoma, Kansas, etc.	4,589	1.7		410		4,754	1.8			539	
Texas Inland	135	.1	(3)	20	(3)	182	.2		(3)	17	(3)
Texas Gulf Coast	21,098	3.3		3,070		22,485	3.4	2		3,417	
Louisiana Gulf Coast	6,695	2.6		642		6,409	2.6			757	
Arkansas, Louisiana Inland, etc.	1,953	5.9		177		2,062	5.2			205	
Rocky Mountain	209	.2		87		324	.3	------		88	
West Coast	5,369	1.3		651		5,818	1.3	2		639	
Total	56,111	1.9		8,950		59,389	2.0	22		9,874	

[1] Preliminary figures.
[2] Includes Hawaii.
[3] Figures not available.

TABLE 70.—Average monthly refinery prices of five selected grades of lubricating oil in the United States, in cents per gallon

Year and grade	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year
1959:													
Oklahoma:													
200 viscosity, No. 3 color, neutral	17.00	17.00	17.00	17.00	17.00	17.00	17.03	17.97	18.00	18.00	18.45	19.00	17.54
150–160 viscosity at 210° bright stock, 10–25 pour test	20.50	20.50	20.50	20.50	20.50	20.50	20.56	21.50	21.50	21.50	21.93	22.50	21.04
Pennsylvania:													
200 viscosity, No. 3 color, neutral 420–425 flash, 25 pour test	21.00	21.00	21.00	21.00	21.00	21.00	22.77	23.00	24.73	25.00	25.00	25.48	22.67
600 steam-refined, cylinder stock filterable	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.87	16.00	16.00	16.71	15.38
South Texas: 500 viscosity, No. 2½–3½ color, neutral	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.33	19.00	18.11
1960:													
Oklahoma:													
200 viscosity, No. 3 color, neutral	19.00	19.00	19.00	19.00	20.11	20.50	20.50	20.50	20.50	20.50	20.50	20.50	19.97
150–160 viscosity at 210° bright stock, 10–25 pour test	22.50	22.50	22.50	22.50	23.24	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.15
Pennsylvania:													
200 viscosity, No. 3 color, neutral 420–425 flash, 25 pour test	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.63	28.00	28.00	28.00	27.30
600 steam-refined, cylinder stock, filterable	17.00	17.91	18.00	18.00	18.00	18.00	18.00	18.66	19.00	19.00	19.00	19.00	18.30
South Texas: 500 viscosity, No. 2½–3½ color, neutral	19.00	19.00	19.00	19.00	19.00	19.47	20.00	20.00	20.00	20.00	20.00	20.00	19.54

Source: Platt's Oil Price Handbook.

TABLE 71.—Salient statistics of jet fuel in the United States, 1959–60 by months and districts

(Thousand barrels)

Month and district	1959: Production, blended from— Gasoline	Kerosine	Distillate	Total	Transfers from gasoline plants	Imports	Exports	Stocks, end of period	Domestic demand	1960 [1]: Production, blended from— Gasoline	Kerosine	Distillate	Total	Transfers from gasoline plants	Imports	Exports	Stocks, end of period	Domestic demand
By months:																		
January	4,499	943	670	6,112	40	2,201	-------	6,257	7,988	5,602	998	650	7,250	127	608	57	6,846	8,973
February	4,717	877	624	6,218	40	1,215	85	6,499	7,196	5,629	1,091	594	7,314	50	1,415	-------	7,041	8,584
March	5,951	1,022	985	7,958	137	851	14	7,879	7,552	5,427	1,199	646	7,272	114	863	1	6,386	8,903
April	5,372	1,145	637	7,154	79	1,307	1	7,842	8,576	5,663	1,210	564	7,437	40	580	-------	6,556	7,887
May	4,805	1,481	774	7,060	70	480	27	7,960	7,465	5,466	1,268	604	7,338	116	1,552	-------	6,810	8,752
June	5,254	1,358	719	7,331	92	515	5	7,995	7,898	5,681	1,420	793	7,894	16	1,289	1	6,753	9,255
July	5,610	1,521	843	7,974	51	952	2	7,995	8,975	5,550	1,174	804	7,528	101	1,262	20	6,892	8,732
August	6,125	2,137	782	9,044	1	697	72	8,433	9,232	5,601	1,167	1,028	7,796	33	880	4	7,343	8,254
September	5,249	2,129	821	8,199	23	2,285	14	7,937	10,989	5,099	1,034	828	6,961	78	782	10	6,431	8,723
October	5,728	2,205	855	8,788	93	643	78	8,044	9,339	5,000	1,093	805	6,898	67	907	-------	6,034	8,269
November	5,493	1,913	780	8,186	34	994	62	8,435	8,761	5,228	1,243	820	7,291	70	1,117	20	6,020	8,472
December	5,422	2,824	663	8,909	98	1,432	79	[2] 8,741	10,054	5,309	1,107	853	7,269	49	1,383	-------	6,456	8,265
Total	64,225	19,555	9,153	92,933	758	13,572	389	[2] 8,741	104,020	65,255	14,004	8,989	88,248	861	12,638	113	6,456	103,069

By districts:																		
East Coast	2,487	375	242	3,104	----------	12,804		1,323		2,001	1,011	52	3,064	--------	11,661		682	
Appalachian No. 1	205	--------	--------	205	----------			67		94	--------	--------	94	--------			49	
Appalachian No. 2	37	87	--------	124	----------			70		-------	400	--------	400	--------			59	
Indiana, Illinois, Kentucky, etc.	4,453	1,391	1,254	7,098	----------			735		4,278	905	2,179	7,362	--------			647	
Minnesota, Wisconsin, North and South Dakota	419	16	--------	435	----------	-------		103		705	74	--------	779	--------	-------		135	
Oklahoma, Kansas, Missouri, etc.	10,990	2,754	1,710	15,454	----------		(³)	1,147	(³)	11,533	2,131	2,708	16,372	--------		(³)	882	(³)
Texas Inland	10,297	609	1,306	12,212	66			858		10,445	938	1,329	12,712	--------			648	
Texas Gulf Coast	8,388	8,318	387	17,093	----------			1,137		10,500	4,156	92	14,748	--------			1,092	
Louisiana Gulf Coast	8,103	175	338	8,616	----------	9		736		7,940	287	88	8,315	--------	-------		309	
Arkansas, Louisiana Inland, etc.	716	--------	--------	716	692			58		737	--------	148	885	861			140	
New Mexico	545	17	648	1,210	----------			106		1,338	30	--------	1,368	--------			86	
Rocky Mountain	4,877	1,315	566	6,758	----------	-------		541		3,904	856	562	5,322	--------	-------		394	
West Coast	12,708	4,498	2,702	19,908	----------	759		1,860		11,780	3,216	1,831	16,827	--------	977		1,383	
Total	64,225	19,555	9,153	92,933	758	13,572	--------	[2] 8,741	--------	65,255	14,004	8,989	88,248	861	12,638	------	6,456	-------

[1] Preliminary data. Data for 1960 includes Hawaii; for details of Hawaii for 1959 see table 5.

[2] For comparison with 1960—excludes 867,000 barrels of commercial jet fuel stocks, which were transferred to kerosine.

[3] Not available.

ASPHALT AND ROAD OIL

Total demand for petroleum asphalt increased 2.2 percent in 1960. Whereas refinery output (17,940,000 short tons) was 187,000 tons greater than a year ago, imports declined 137,000 tons. Demand exceeded new supply and resulted in a withdrawal from stocks of 147,000 short tons.

Sales of asphalt and asphaltic products in 1960 totaled 20,076,000 short tons, a 1.5 percent increase for the year. Asphalt paving products, which represent 73.2 percent of total sales, were 0.7 percent higher than a year ago. Roofing product sales increased 6.9 percent whereas sales for all other asphalt products declined 1.7 percent.

The year 1960 was the first full year in which imports of asphalt were under the control of the Oil Import Administration.

The demand for road oil, based on production and stock change at the refinery, totaled 5.9 million barrels in 1960 compared with 6.3 million in 1959. Sales of road oil, which includes some products, which were reclassified after leaving the refinery, totaled 6.4 million barrels, a gain of 1.6 percent.

TABLE 72.—Statistical summary of petroleum asphalt and road oil

(Thousand short tons) [1]

	1956	1957	1958	1959	1960
Petroleum asphalt:					
Production	16,479	15,579	16,251	17,753	17,940
Imports [2] (including natural)	656	1,162	1,360	1,250	1,113
Exports [3]	275	325	248	188	167
Stocks (end of period)	1,664	1,902	1,774	1,991	1,844
Apparent domestic consumption [4]	16,609	16,178	17,491	18,598	19,033
Petroleum asphalt sales:					
Paving	12,208	11,934	13,384	14,581	14,689
Roofing	3,411	2,819	3,101	3,299	3,525
All other	1,638	1,620	1,694	1,895	1,862
Total	17,257	16,373	18,179	19,775	20,076
Road oil:					
Production	1,459	1,311	1,077	1,181	1,085
Stocks (end of period)	91	107	76	119	135
Apparent domestic consumption [5]	1,470	1,295	1,108	1,138	1,069
Road oil sales	1,493	1,306	1,165	1,143	1,161

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Imports into the United States only.
[3] Includes shipments to noncontiguous territories.
[4] Production, plus imports, less exports, plus or minus stock change.
[5] Production, plus or minus change in stocks.

TABLE 73.—Salient statistics of petroleum asphalt in the United States, by months and districts

(Thousand short tons) [1]

Month and district	Production		Imports [2] (including natural)		Exports [3]		Stocks (end of period)		Domestic demand	
	1959	1960 [4]	1959	1960 [4]	1959	1960 [4]	1959	1960 [4]	1959	1960 [4]
Month:										
January	820	826	125	81	13	6	2,045	2,334	661	557
February	796	793	58	36	11	11	2,313	2,567	575	585
March	1,231	867	117	40	23	13	2,594	2,776	1,044	685
April	1,395	1,403	69	111	11	17	2,770	3,060	1,277	1,213
May	1,687	1,718	54	53	17	10	2,791	3,098	1,703	1,723
June	1,924	2,008	166	214	13	16	2,587	2,866	2,281	2,438
July	2,094	2,141	124	116	20	12	2,337	2,593	2,447	2,518
August	2,074	2,203	172	102	14	13	2,075	2,052	2,495	2,833
September	1,937	2,027	133	98	15	25	1,816	1,656	2,313	2,496
October	1,713	1,771	101	88	21	17	1,742	1,480	1,867	2,018
November	1,204	1,239	56	99	16	15	1,859	1,562	1,127	1,241
December	878	944	75	75	14	12	1,990	1,844	808	725
Total	17,753	17,940	1,250	1,113	188	167	1,990	1,844	18,598	19,032
District:										
East Coast	3,696	3,918					357	385		
Appalachian No. 1	224	227					10	9		
Appalachian No. 2	468	442					38	39		
Indiana, Illinois, Kentucky, etc.	3,184	3,423					319	306		
Minnesota, Wisconsin, North Dakota	220	244					41	25		
Oklahoma, Kansas, etc.	1,825	1,890	(5)	(5)	(5)	(5)	346	268	(5)	(5)
Texas Inland	972	865					100	85		
Texas Gulf Coast	1,287	1,415					68	92		
Louisiana Gulf Coast	715	808					84	121		
Arkansas, Louisiana Inland, etc.	863	773					138	105		
New Mexico	93	89					15	14		
Rocky Mountain	1,242	1,275					225	166		
West Coast	2,964	2,571					249	229		
Total	17,753	17,940	1,250	1,113	188	167	1,990	1,844	18,598	19,032

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Imports into the United States only.
[3] Excludes shipments to noncontiguous territories.
[4] Preliminary figures.
[5] Not available.

TABLE 74.—Salient statistics of road oil in the United States by months and districts

(Short tons) [1]

Month and district	Production 1959	Production 1960 [2]	Stocks (end of period) 1959	Stocks (end of period) 1960 [2]	Domestic demand 1959	Domestic demand 1960 [2]
Month:						
January	11,273	13,455	75,274	120,182	11,818	12,000
February	30,909	38,545	98,183	142,727	8,000	16,000
March	56,364	27,636	136,002	159,636	18,545	10,727
April	95,091	93,818	192,184	212,000	38,909	41,454
May	136,727	125,455	239,456	259,091	89,455	78,364
June	179,455	153,091	218,366	260,909	200,545	151,273
July	240,727	216,364	186,184	243,273	272,909	234,000
August	189,818	171,454	149,275	173,818	226,727	240,909
September	113,273	93,636	120,912	127,454	141,636	140,000
October	60,727	58,909	111,455	116,545	70,184	69,818
November	29,818	44,545	108,000	132,727	33,273	28,363
December	36,364	48,546	118,728	135,091	25,636	46,183
Total	1,180,546	1,085,454	118,728	135,091	1,137,637	1,069,091
District:						
East Coast	4,182	4,364				
Appalachian No. 1						
Appalachian No. 2						
Indiana, Illinois, Kentucky, etc.	300,364	324,727	12,364	16,000		
Minnesota, Wisconsin, North Dakota	27,455	42,363				
Oklahoma, Kansas, etc.	252,000	192,364	27,273	11,455		
Texas Inland					(3)	(3)
Texas Gulf Coast	2,909	2,182	364	182		
Louisiana Gulf Coast	1,818	5,273	545	182		
Arkansas, Louisiana Inland, etc.	3,273	2,364	364	181		
New Mexico						
Rocky Mountain	350,000	266,727	49,091	30,909		
West Coast	238,545	245,090	28,727	76,182		
Total	1,180,546	1,085,454	118,728	135,091	1,137,637	1,069,091

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Preliminary figures.
[3] Not available.

TABLE 75.—Sales of petroleum-asphalt paving products in the United States, by PAD districts and States

(Short tons)

District and State	Asphalt cements		Cutback asphalts		Emulsified asphalts		Total	
	1959	1960	1959	1960	1959	1960	1959	1960
District 1:								
Connecticut	119, 252	120, 219	56, 404	57, 249	3, 918	13	179, 574	177, 481
Delaware	21, 795	19, 724	12, 848	16, 269	82	5, 879	34, 725	41, 872
Florida	340, 051	253, 066	150, 298	113, 678	23, 446	24, 226	513, 795	390, 970
Georgia	265. 392	208, 416	81, 647	59, 144	9. 401	33, 802	356, 440	301, 362
Maine	51, 775	49, 076	62, 447	72, 994	9, 734	14, 774	123. 956	136, 844
Maryland and District of Columbia	173, 186	166, 920	74, 286	68, 742	18, 628	37, 138	266, 100	272, 800
Massachusetts	275, 254	257, 346	55, 091	51, 657	711	900	331, 056	309. 903
New Hampshire	31, 803	40. 994	48, 674	48, 582	51	67	80, 528	89, 643
New Jersey	265, 158	244, 189	112, 366	95, 077	20, 324	19, 786	397, 848	359, 052
New York	496, 790	569, 788	235. 747	254, 288	129, 590	130, 426	862, 127	954, 502
North Carolina	162, 063	193, 205	75, 010	88, 102	58, 989	101, 826	296, 062	383, 133
Pennsylvania	359, 721	384, 259	161, 358	158, 735	48, 336	55, 205	569, 415	598, 199
Rhode Island	41, 450	45, 109	43, 484	49, 218	58	----------	84, 992	94, 327
South Carolina	136, 774	139. 777	37, 694	36, 592	16, 410	80, 207	190, 878	256, 576
Vermont	11, 669	17, 000	23, 279	22, 846	1, 062	326	36, 010	40, 172
Virginia	170, 233	186, 598	109, 164	97, 095	8, 891	27. 771	288, 288	311, 464
West Virginia	57, 914	70, 227	23, 755	32, 523	2, 873	13, 357	84, 542	116, 107
Total	2. 980, 280	2, 965, 913	1, 363, 552	1, 322, 791	352, 504	545, 703	4, 696, 336	4, 834, 407
District 2:								
Illinois	346, 886	229, 991	160, 650	174, 196	9, 808	8, 336	517, 344	412, 523
Indiana	150, 683	178, 186	123, 518	144, 005	111, 841	117, 918	386, 042	440, 109
Iowa	209, 995	279, 087	102, 282	117, 012	44, 663	44, 935	356, 940	441, 034
Kansas	117, 883	141, 531	278, 276	235, 291	143	1. 165	396, 302	377, 987
Kentucky	176, 094	133, 134	112, 034	85, 765	18, 162	55, 141	306, 290	274, 040
Michigan	268, 084	298, 742	105, 015	88, 346	53, 378	60, 136	426, 477	447, 224
Minnesota	148, 219	176, 431	208, 485	211, 203	16, 596	18, 991	373, 300	406, 625
Missouri	112, 285	157, 828	192, 032	216, 318	8, 221	11, 779	312, 538	385, 925
Nebraska	50, 002	63, 778	91, 021	73, 660	60	125	141, 083	137, 563
North Dakota	68, 546	74, 885	76, 346	55, 864	66, 299	68, 634	211, 191	199, 383
Ohio	443, 672	494, 760	333, 994	338, 208	116, 970	163, 089	894, 636	996, 057
Oklahoma	153, 405	152, 378	130, 735	182, 188	904	7, 576	285, 044	342, 142
South Dakota	83, 520	54, 088	45, 819	49, 592	11, 917	4, 814	141, 256	108, 494
Tennessee	215, 132	168, 282	108, 692	82, 474	17, 528	18, 299	341, 352	269, 055
Wisconsin	208, 079	202, 410	106, 685	115, 050	4, 125	6, 146	318, 889	323, 606
Total	2, 752. 485	2, 805, 511	2, 175, 584	2, 169, 172	480, 615	587, 084	5. 408, 684	5, 561, 767
District 3:								
Alabama	154, 758	160, 517	78, 335	81, 169	26, 492	40. 097	259, 585	281, 783
Arkansas	63, 717	61, 336	42, 420	48, 083	19, 383	16, 691	125, 520	126, 110
Louisiana	228, 839	169, 732	23, 046	22, 236	25, 280	24, 575	277, 165	216, 543
Mississippi	82, 905	83, 139	24, 606	24, 064	19, 337	14, 953	126, 848	122, 156
New Mexico	113, 090	89, 880	71, 955	67, 439	10, 160	2, 117	195, 205	159, 436
Texas	742, 266	642, 780	214, 517	185, 757	35, 849	31, 606	992, 632	860, 143
Total	1. 385, 575	1, 207, 384	454, 879	428, 748	136, 501	130, 039	1, 976, 955	1, 766, 171
District 4:								
Colorado	162, 645	162, 835	63, 406	90, 942	352	3, 510	226, 403	257, 287
Idaho	33, 716	32, 167	38, 765	37, 965	2, 101	3, 722	74, 582	73, 854
Montana	63, 674	79, 339	53, 177	59, 242	6, 895	10, 362	123. 746	148, 943
Utah	78, 502	75, 294	53, 323	59, 466	5	----------	131, 830	134, 760
Wyoming	39, 470	71, 329	32, 726	40, 696	2, 902	269	75, 098	112, 294
Total	378, 007	420, 964	241, 397	288, 311	12, 255	17, 863	631, 659	727, 138
District 5:								
Alaska	4, 255	5, 618	1, 268	1, 676	----------	----------	5, 523	7, 294
Arizona	51. 401	75, 671	35, 966	42, 076	14, 102	43, 786	101, 469	161, 538
California	1, 047, 627	888, 644	134, 745	104, 470	117, 993	168, 992	1, 300, 365	1, 162, 106
Hawaii	(1)	----------	(1)	----------	(1)	----------	(1)	----------
Nevada	27, 243	17, 750	10. 051	8, 438	3, 788	9, 578	41, 082	35, 766
Oregon	162, 792	181, 922	36, 899	36, 292	9. 564	13, 764	209, 255	231, 978
Washington	124, 785	110, 208	79, 896	84, 011	4, 726	6, 890	209, 407	201, 109
Total	1, 418, 103	1, 279. 813	298, 825	276, 963	150, 173	243, 010	1. 867, 101	1, 799, 786
Total United States	8, 914, 450	8, 679, 585	4, 534, 237	4, 485, 985	1, 132, 048	1, 523, 699	14,580,735	14, 689, 269

[1] Not included in the United States total before 1960.

TABLE 76.—Sales of petroleum-asphalt roofing products in the United States, by PAD districts and States

(Short tons)

District and State	Asphalt cements and fluxes		Emulsified asphalts		Total	
	1959	1960	1959	1960	1959	1960
District 1:						
Connecticut	20,491	18,463	24	41	20,515	18,504
Delaware	1,530	1,335	184	162	1,714	1,497
Florida	98,006	119,274	15		98,021	119,274
Georgia	110,215	156,829	23	80	110,238	156,909
Maine						
Maryland and District of Columbia	43,080	51,251	90	184	43,170	51,435
Massachusetts	57,310	67,596	88	173	57,398	67,769
New Hampshire	3	3	25	14	28	17
New Jersey	301,090	321,092	139	332	301,229	321,424
New York	44,645	47,782	364	489	45,009	48,271
North Carolina	44,399	45,154		678	44,399	45,832
Pennsylvania	138,232	172,095	471	609	138,703	172,704
Rhode Island	39,860	37,260	16	20	39,876	37,280
South Carolina	48,018	55,362	570		48,588	55,362
Vermont	46	101	6	8	52	109
Virginia	4,532	7,656	44	55	4,576	7,711
West Virginia	41,454	37,284		136	41,454	37,420
Total	992,911	1,138,537	2,059	2,981	994,970	1,141,518
District 2:						
Illinois	500,207	492,032	81	189	500,288	492,221
Indiana	89,389	68,554	116	80	89,505	68,634
Iowa	11,008	9,180			11,008	9,180
Kansas	22,570	25,558			22,570	25,558
Kentucky	2,117	863	97	13	2,214	876
Michigan	54,150	54,030	327	372	54,477	54,402
Minnesota	115,621	115,004	86	95	115,707	115,099
Missouri	163,120	173,428			163,120	173,428
Nebraska	6,351	5,654			6,351	5,654
North Dakota	1,457	2,159			1,457	2,159
Ohio	61,503	195,921	3,163	3,039	64,666	198,960
Oklahoma	327	21,066			327	21,066
South Dakota	1,510	2,651			1,510	2,651
Tennessee	48,674	63,433	1		48,675	63,433
Wisconsin	14,619	12,632	251	409	14,870	13,041
Total	1,092,623	1,242,165	4,122	4,197	1,096,745	1,246,362
District 3:						
Alabama	122,162	117,064	44	1	122,206	117,065
Arkansas	57,837	57,808			57,837	57,808
Louisiana	146,721	115,679			146,721	115,679
Mississippi	10,263	9,028			10,263	9,028
New Mexico	11,981	16,096			11,981	16,096
Texas	243,885	227,630			243,885	227,630
Total	592,849	543,305	44	1	592,893	543,306
District 4:						
Colorado	23,906	31,574			23,906	31,574
Idaho	4,792	3,753			4,792	3,753
Montana	3,367	6,656			3,367	6,656
Utah	6,785	7,247	2	12	6,787	7,259
Wyoming	3,364	3,397			3,364	3,397
Total	42,214	52,627	2	12	42,216	52,639
District 5:						
Alaska	1,258	1,716			1,258	1,716
Arizona	711	226			711	226
California	437,877	404,304	104	1,493	437,981	405,797
Hawaii	(1)	5,565	(1)		(1)	5,565
Nevada	150	382			150	382
Oregon	99,855	107,646	5		99,860	107,646
Washington	32,148	19,884	6		32,154	19,884
Total	571,999	539,723	115	1,493	572,114	541,216
Total, United States	3,292,596	3,516,357	6,342	8,684	3,298,938	3,525,041

[1] Not included in the United States total before 1960.

TABLE 77.—Sales of all other petroleum-asphalt products in the United States, by PAD districts and States

(Short tons)

District and State	Asphalt cements and fluxes		Emulsified asphalts		Total	
	1959	1960	1959	1960	1959	1960
District 1:						
Connecticut	12,088	11,917	406	458	12,494	12,375
Delaware	2,117	2,316	15	3	2,132	2,319
Florida	106,219	121,314	1,873	1,260	108,092	122,574
Georgia	56,049	16,335	1,970	735	58,019	17,070
Maine	4,797	2,595	374	132	5,171	2,727
Maryland and District of Columbia	19,549	24,422	1,238	697	20,787	25,119
Massachusetts	54,111	55,322	1,396	1,383	55,507	56,705
New Hampshire	460	264	31	49	491	313
New Jersey	236,745	207,168	3,453	3,444	240,198	210,612
New York	40,506	33,173	2,307	2,351	42,813	35,524
North Carolina	70,708	72,264	319	128	71,027	72,392
Pennsylvania	157,332	124,722	2,963	2,656	160,295	127,378
Rhode Island	7,642	9,012	171	140	7,813	9,152
South Carolina	1,243	1,371	93	70	1,336	1,441
Vermont	2,572	2,606	16	9	2,588	2,615
Virginia	18,944	15,990	347	617	19,291	16,607
West Virginia	18,505	22,254	145	----------	18,650	22,254
Total	809,587	723,045	17,117	14,132	826,704	737,177
District 2:						
Illinois	225,991	232,560	8,900	9,870	234,891	242,430
Indiana	105,014	96,431	332	797	105,346	97,228
Iowa	6,347	4,614	37	1,292	6,384	5,906
Kansas	12,994	14,501	6	125	13,000	14,626
Kentucky	958	2,121	992	1,359	1,950	3,480
Michigan	27,870	32,185	5,258	4,811	33,128	36,996
Minnesota	31,255	31,968	90	558	31,345	32,526
Missouri	46,905	49,034	1,025	1,554	47,930	50,588
Nebraska	3,242	2,676	5	22	3,247	2,698
North Dakota	4,813	3,628	----------	122	4,813	3,750
Ohio	100,639	99,149	4,237	3,158	104,876	102,307
Oklahoma	14,010	22,343	34	70	14,044	22,413
South Dakota	55	101	----------	----------	55	101
Tennessee	17,795	9,356	152	138	17,947	9,494
Wisconsin	45,742	38,848	126	1,274	45,868	40,122
Total	643,630	639,515	21,194	25,150	664,824	664,665
District 3:						
Alabama	15,747	13,606	585	1,086	16,332	14,692
Arkansas	7,463	8,032	202	31	7,665	8,063
Louisiana	70,869	85,230	3,119	3,511	73,988	88,741
Mississippi	17,471	14,193	758	616	18,229	14,809
New Mexico	2,501	2,224	39	30	2,540	2,254
Texas	92,602	74,577	2,515	2,088	95,117	76,665
Total	206,653	197,862	7,218	7,362	213,871	205,224
District 4:						
Colorado	7,948	6,185	353	170	8,301	6,355
Idaho	425	375	44	41	469	416
Montana	2,611	1,642	27	9	2,638	1,651
Utah	1,629	614	54	35	1,683	649
Wyoming	4,057	2,111	8	12	4,065	2,123
Total	16,670	10,927	486	267	17,156	11,194
District 5:						
Alaska	1,555	----------	----------	2	1,555	2
Arizona	1,765	1,901	195	215	1,960	2,116
California	140,613	191,505	6,511	13,947	147,124	205,452
Hawaii	(1)	----------	(1)	----------	(1)	----------
Nevada	306	424	23	30	329	454
Oregon	6,991	5,264	1,910	1,328	8,901	6,592
Washington	11,239	27,416	1,252	1,111	12,491	28,527
Total	162,469	226,510	9,891	16,633	172,360	243,143
Total United States	1,839,009	1,797,859	55,906	63,544	1,894,915	1,861,403

[1] Not included in the U.S. total before 1960.

TABLE 78.—Sales of petroleum asphalts and road oil in the United States, 1959–60, by PAD districts and States

(Short tons)

District and State	Asphalt cements and fluxes	Emulsified asphalts	Outback asphalts	Total 1960	Total 1959	Percent change	Road oil 1960	Road oil 1959	Percent change
District 1:									
Connecticut	150, 599	512	57, 249	208, 360	212, 583	−2.0	31	----	----
Delaware	23, 375	6, 044	16, 269	45, 688	38, 571	18.5	62	83	−25.3
Florida	493, 654	25, 486	113, 678	632, 818	719, 908	−12.1	----	----	----
Georgia	381, 580	34, 617	59, 144	475, 341	524, 697	−9.4	----	----	----
Maine	51, 671	14, 906	72, 994	139, 571	129, 127	8.1	54	1, 484	−96.4
Maryland and District of Columbia	242, 593	38 019	68, 742	349, 354	330, 057	5.9	83	534	−84.5
Massachusetts	380, 264	2, 456	51, 657	434, 377	443, 961	−2.2	517	755	−31.5
New Hampshire	41, 261	130	48, 582	89, 973	81, 047	11.0	7	----	----
New Jersey	772, 449	23, 562	95, 077	891, 088	939, 275	−5.1	933	2, 838	−67.1
New York	650, 743	133, 266	254, 288	1, 038, 297	949, 949	9.3	646	336	92.3
North Carolina	310, 623	102, 632	88, 102	501, 357	411, 488	21.8	----	----	----
Pennsylvania	681, 076	58, 470	158, 735	898, 281	868, 413	3.4	8, 356	9, 970	−16.2
Rhode Island	91, 381	160	49, 218	140, 759	132, 681	6.1	40	9	344.4
South Carolina	196, 510	80, 277	36, 592	313, 379	240, 802	30.1	----	14	----
Vermont	19, 707	343	22, 846	42, 896	38, 650	11.0	----	----	----
Virginia	210, 244	28, 443	97, 095	335, 782	312, 155	7.6	----	----	----
West Virginia	129, 765	13, 493	32, 523	175, 781	144, 646	21.5	86	467	−81.6
Total 1960	4, 827, 495	562, 816	1, 322, 791	6, 713, 102	----	3.0	10, 815	----	−34.4
Total 1959	4, 782, 778	371, 680	1, 363, 552	----	6, 518, 010	----	----	16, 490	----
District 2:									
Illinois	954, 583	18, 395	174, 196	1, 147, 174	1, 252, 523	−8.4	251, 174	232, 541	8.0
Indiana	343, 171	118, 795	144, 005	605, 971	580, 893	4.3	22, 691	30, 910	−26.6
Iowa	292, 881	46, 227	117, 012	456, 120	374, 332	21.9	39, 528	36, 564	8.1
Kansas	181, 590	1, 290	235, 291	418, 171	431, 872	−3.2	2, 970	3, 459	−14.1
Kentucky	136, 118	56, 513	85, 765	278, 396	310, 454	−10.3	5, 656	10, 637	−46.8
Michigan	384, 957	65, 319	88, 346	538, 622	514, 082	4.8	24, 804	24, 873	−0.3
Minnesota	323, 403	19, 644	211, 203	554, 250	520, 352	6.5	22, 164	17, 884	23.9
Missouri	380, 290	13, 333	216, 318	609, 941	523, 588	16.5	108, 256	83, 944	29.0
Nebraska	72, 108	147	73, 660	145, 915	150, 681	−3.2	3, 671	2, 725	34.7
North Dakota	80, 672	68, 756	55, 864	205, 292	217, 461	−5.6	10, 231	8, 060	26.9
Ohio	789, 830	169, 286	338, 208	1, 297, 324	1, 064, 178	21.9	17, 913	20, 137	−11.0
Oklahoma	195, 787	7, 646	182, 188	385, 621	299, 415	28.8	4, 060	2, 482	63.6
South Dakota	56, 840	4, 814	49, 592	111, 246	142, 821	−22.1	28, 772	25, 993	10.7
Tennessee	241, 071	18, 437	82, 474	341, 982	407, 974	−16.2	15	----	----
Wisconsin	253, 890	7, 829	115, 050	376, 769	379, 627	−0.8	176, 239	130, 256	35.3
Total 1960	4, 687, 191	616, 431	2, 169, 172	7, 472, 794	----	4.2	718, 144	----	13.9
Total 1959	4, 488, 738	505, 931	2, 175, 584	----	7, 170, 253	----	----	630, 465	----

District 3:									
Alabama	291, 187	41, 184	81, 169	413, 540	398, 123	3. 9	125	37	237. 8
Arkansas	127, 176	16, 722	48, 083	191, 981	191, 022	0. 5	130		
Louisiana	370, 641	28, 086	22, 236	420, 963	497, 874	−15. 5	689		
Mississippi	106, 360	15, 569	24, 064	145, 993	155, 340	−6. 0			
New Mexico	108, 200	2, 147	67, 439	177. 786	209, 726	−15. 2	7, 164	4, 925	45. 5
Texas	944, 987	33, 694	185, 757	1, 164, 438	1, 331, 634	−12. 6	40, 988	41, 008	−0. 1
Total 1960	1, 948, 551	137, 402	428, 748	2, 514, 701		−9. 7	49, 096		6. 8
Total 1959	2, 185, 077	143, 763	454, 879		2, 783, 719			45, 970	
District 4:									
Colorado	200, 594	3, 680	90, 942	295, 216	258, 610	14. 2	15, 237	21, 486	−29. 1
Idaho	36, 295	3. 763	37, 965	78, 023	79, 843	−2. 3	16, 814	20, 264	−17. 0
Montana	87, 637	10, 371	59, 242	157, 250	129, 751	21. 2	8, 870	9, 850	−10. 0
Utah	83, 155	47	59, 466	142, 668	140, 300	1. 7	13, 626	16, 769	−18. 7
Wyoming	76. 837	281	40, 696	117, 814	82, 527	42. 8	23, 881	22, 451	6. 4
Total 1960	484, 518	18, 142	288, 311	790, 971		14. 5	78, 428		−13. 7
Total 1959	436, 891	12, 743	241, 397		691, 031			90, 820	
District 5:									
Alaska	7, 334	2	1, 676	9, 012	8, 336	8. 1	2		
Arizona	77, 798	44, 001	42, 076	163. 875	104, 140	57. 4	3, 775	4, 125	−8. 5
California	1, 484, 453	184, 432	104, 470	1, 773, 355	1, 885, 470	−6. 0	283, 788	332, 979	−14. 8
Hawaii	5, 565			5, 565	(1)			(1)	
Nevada	18, 556	9, 608	8, 438	36, 602	41, 561	−11. 9	13, 621	17, 788	−23. 4
Oregon	294, 832	15, 092	36. 292	346, 216	318, 016	8. 9	2, 438	1, 733	40. 7
Washington	157, 508	8, 001	84, 011	249, 520	254, 052	−1. 8	1, 193	2, 472	−51. 7
Total 1960	2, 046, 046	261, 136	276, 963	2, 584, 145		−1. 1	304, 817		−15. 1
Total 1959	2, 152, 571	160, 179	298, 825		2, 611, 575			359, 097	
U.S., total 1960	13, 993, 801	1, 595. 927	4, 485, 985	20, 075, 713		1. 5	1, 161, 300		1. 6
U.S., total 1959	14, 046, 055	1, 194, 296	4, 534, 237		19, 774, 588			1, 142, 842	

[1] Not included in the U.S. total before 1960.

OTHER PRODUCTS

Wax.—As a result of a 29.3 percent increase in exports, the total demand for wax in 1960 was 3.3 percent higher than in 1959. Domestic demand totaled 4.4 million barrels, 2.6 percent less than 1959. Wax is used mainly for waterproofing paper products and for candles.

Posted prices on wax in bulk lots at Atlantic and gulf coast refineries were unchanged in 1960. The first price change at Western Pennsylvania refineries since November 1956 took place in November 1960, and the average monthly quoted price dropped from 6.25 cents per pound to 6.13 cents.

TABLE 79.—Salient statistics of wax in the United States, by types, months, and districts

(Thousand barrels)[1]

Month and district	1959										
	Production				Imports (all types)	Exports (all types)	Stocks end of period				Domestic demand (all types)
	Microcrystalline	Fully refined	Other	Total			Microcrystalline	Fully refined	Other	Total	
By months:											
January	59	252	188	499	1	72	124	255	335	714	426
February	58	203	147	408	-------	82	118	272	293	683	357
March	76	234	156	466	2	96	116	282	286	684	371
April	57	251	198	506	1	85	110	285	320	715	391
May	77	199	197	473	3	92	112	293	336	741	358
June	61	208	197	466	-------	95	100	291	330	721	391
July	73	203	154	430	1	82	98	284	319	701	369
August	60	222	164	446	5	75	100	284	327	711	366
September	72	241	156	469	2	93	105	284	320	709	380
October	79	228	147	454	3	76	131	278	288	697	393
November	94	224	147	465	2	86	138	297	285	720	358
December	75	257	216	548	1	100	131	309	334	774	395
Total	841	2,722	2,067	5,630	21	1,034	131	309	334	774	4,555
By districts:											
East Coast	230	1,217	463	1,910	2		26	74	117	217	
Appalachian No. 1	14	43	278	335			11	42	15	68	
Appalachian No. 2	-------	35	29	64			-------	9	-------	9	
Indiana, Illinois, Kentucky, etc.	29	209	62	300	-------		1	8	10	19	
Oklahoma, Kansas, etc.	372	29	227	628		(3)	39	7	33	79	(3)
Texas Inland	15	-------	26	41			25	-------	-------	25	
Texas Gulf Coast	136	567	417	1,120	19		19	31	107	157	
Louisiana Gulf Coast	40	29	557	626			7	11	35	53	
Rocky Mountain	5	55	8	68	-------		3	9	17	29	
West Coast	-------	538	-------	538	-------		-------	118	-------	118	
Total	841	2,722	2,067	5,630	21	-------	131	309	334	774	-------

See footnotes at end of table.

TABLE 79.—Salient statistics of wax in the United States, by types, months, and districts—Continued

(Thousand barrels) [1]

Month and district	1960 [2]										
	Production				Imports (all types)	Exports (all types)	Stocks end of period				Domestic demand (all types)
	Microcrystaline	Fully refined	Other	Total			Microcrystalline	Fully refined	Other	Total	
By months:											
January	86	226	144	456	1	99	145	315	329	789	343
February	55	225	199	479	1	110	128	314	357	799	360
March	93	279	139	511	2	105	134	338	310	782	425
April	61	251	155	467	-------	93	118	347	317	782	374
May	76	266	170	512	1	109	117	359	338	814	372
June	59	233	170	462	1	116	114	322	339	775	386
July	75	244	137	456	-------	91	130	345	325	800	340
August	73	233	194	500	-------	116	151	313	356	820	364
September	50	233	170	453	-------	118	156	281	331	768	387
October	59	304	252	615	-------	130	165	304	409	878	375
November	54	281	179	514	-------	122	197	302	393	892	378
December	46	254	171	471	-------	124	165	336	404	905	334
Total	787	3,029	2,080	5,896	6	1,333	165	336	404	905	4,438
By districts:											
East Coast	200	1,444	381	2,025			20	79	117	216	
Appalachian No. 1	13	66	188	267	------		16	48	23	87	
Appalachian No. 2	-------	34	23	57			-------	8	-------	8	
Indiana, Illinois, Kentucky, etc.	27	226	103	356	------		1	16	25	42	
Oklahoma, Kansas, etc.	364	17	297	678		(3)	80	9	52	141	(3)
Texas Inland	57	-------	-------	57			20	-------	-------	20	
Texas Gulf Coast	88	635	530	1,253	6		20	40	129	189	
Louisiana Gulf Coast	33	30	544	607			3	24	41	68	
Rocky Mountain	5	63	14	82	-------		5	11	17	33	
West Coast	-------	514	-------	514	-------		-------	101	-------	101	
Total	787	3,029	2,080	5,896	6	-------	165	336	404	905	-------

[1] Conversion factor: 280 pounds to the barrel.
[2] Preliminary data. Data for 1960 includes Hawaii; for details of Hawaii for 1959 see table 5.
[3] Not available.

TABLE 80.—Average monthly refinery prices of 124°–126° white crude scale wax at Pennsylvania refineries

(Cents per pound)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year
1956	5.91	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.03	6.25	6.02
1957	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1958	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1959	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1960	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.23	6.13	6.24

Source: Platt's Oil price handbook.

Coke.—A substantial share of the reported increase in petroleum coke production for 1960 is nonmarketable catalyst coke used as a refinery fuel. The reported production of this product was understated in other years. More complete reporting was obtained beginning in June 1960.

The total demand for marketable petroleum coke in 1960 was 27,375 thousand barrels, an increase of 21.6 percent. Exports increased 46.5 percent and the domestic demand was 15.1 percent higher. Coke with a low sulphur content is used in making electrodes required in the electrolic production of aluminum.

TABLE 81.—Salient statistics of petroleum coke in the United States, by months and districts [1]

(Thousand barrels unless otherwise stated)

Month and district	Production		Yields (percent)		Domestic demand		Exports		Stocks, end of period	
	1959	1960 [2]	1959	1960 [2]	1959	1960 [2]	1959	1960 [2]	1959	1960 [2]
By months:										
January	3,413	3,839	1.3	1.5	2,827	3,173	431	558	4,973	5,813
February	3,182	3,531	1.3	1.5	2,751	3,119	197	396	5,207	5,829
March	3,679	3,993	1.4	1.6	3,111	3,440	304	428	5,471	5,954
April	3,083	4,047	1.3	1.7	2,751	3,527	334	493	5,469	5,981
May	3,466	4,146	1.4	1.7	2,895	3,711	383	528	5,657	5,888
June	3,620	5,210	1.5	2.1	2,952	4,571	433	693	5,892	5,834
July	3,314	5,662	1.4	2.2	2,755	4,633	436	868	6,015	5,995
August	3,349	6,252	1.3	2.4	3,030	5,806	407	431	5,927	6,010
September	3,425	5,829	1.4	2.4	3,089	5,144	447	656	5,816	6,039
October	3,415	5,765	1.4	2.3	3,253	5,083	496	753	5,482	5,968
November	3,360	5,726	1.4	2.4	2,919	5,171	354	654	5,569	5,869
December	3,811	6,010	1.5	2.4	3,217	7,094	458	398	5,705	4,387
Total	[3] 41,117	[4] 60,010	1.4	2.0	35,550	54,472	4,680	6,856	5,705	4,387
By districts:										
East Coast	7,611	10,076	1.7	2.3					1,100	1,113
Appalachian No. 1	------	101	------	.3					------	------
Appalachian No. 2	351	362	.9	1.0					------	------
Indiana, Illinois, Kentucky, etc.	11,698	13,747	2.2	2.6					1,060	652
Minnesota, Wisconsin, etc.	1,373	1,638	3.6	3.7					315	352
Oklahoma, Kansas, etc.	5,438	7,469	2.1	2.8					194	157
Texas Inland	424	1,025	.4	.9	([5])	([5])	([5])	([5])	66	76
Texas Gulf Coast	3,840	9,068	.6	1.4					------	18
Louisiana Gulf Coast	2,763	3,986	1.1	1.6					19	42
Arkansas, Louisiana Inland, etc.	1,073	1,677	3.3	4.2					673	762
New Mexico	------	28	------	.3					------	------
Rocky Mountain	1,647	2,521	1.6	2.4					566	743
West Coast	4,899	8,312	1.2	1.9					1,712	472
Total	[3] 41,117	[4] 60,010	1.4	2.0					5,705	4,387

[1] Conversion factor: 5.0 barrels to the short ton.
[2] Preliminary figures.
[3] Includes 17,722,000 barrels of nonmarketable catalyst coke.
[4] Includes 33,953,000 barrels of nonmarketable catalyst coke.
[5] Figures not available.

Still Gas.—Still gas production in 1960 totaled 129.5 million barrels, an increase of 2.5 million barrels over 1959. The B.t.u. heating value of the gas declined from 1030 B.t.u. per cubic foot in 1959 to 997 B.t.u. in 1960. Refiners used as refinery fuel 96.6 percent of the still gas produced in 1960.

TABLE 82.—Production of still gas in the United States, by districts

District	1958		1959		1960[1]	
	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels
East Coast	89,405	16,089	95,747	16,648	95,297	16,159
Appalachian No. 1	8,686	1,807	10,173	1,813	10,001	1,763
Appalachian No. 2	10,289	2,070	12,217	1,984	11,494	2,050
Indiana, Illinois, Kentucky, etc	149,069	26,642	152,011	25,821	158,043	26,380
Minnesota, Wisconsin, North Dakota, and South Dakota	6,783	1,124	7,480	1,224	9,224	1,531
Oklahoma, Kansas, etc	63,193	11,141	63,002	10,568	66,949	10,959
Texas Inland	28,891	5,790	29,769	5,203	32,434	5,643
Texas Gulf Coast	156,925	24,466	156,640	24,767	176,309	26,113
Louisiana Gulf Coast	54,658	8,864	48,432	7,468	52,753	7,528
Arkansas, Louisiana Inland, etc	4,947	1,375	6,720	1,215	11,856	2,259
New Mexico	916	189	1,055	187	1,266	223
Rocky Mountain	21,164	4,507	25,186	4,543	22,308	4,139
West Coast	124,915	21,887	141,242	25,517	131,479	24,733
Total	719,841	125,951	749,674	126,958	779,413	129,480

[1] Preliminary figures.

Miscellaneous Oils.—The total production of miscellaneous finished oils in 1960 was 25.9 million barrels, which includes 24.4 million barrels produced at petroleum refineries and 1.5 million produced at natural-gas liquid plants. The demand for these oils increased 8.7 percent during 1960. Domestic demand was 25.2 million barrels and exports were 0.3 million barrels.

A breakdown of the various type of miscellaneous oils produced is shown in table 83. Petrochemicals represent most of the miscellaneous oils produced at refineries, and for 1960 they have been separated from the all-other category.

TABLE 83.—Production of miscellaneous finished oils in the United States in 1960, by districts and classes

(Thousand barrels)

District	Absorption	Petrolatum	Specialty oils			Petrochemicals			All other products	Total
			Medicinal	Spray oils	Other	Plasticizers	Polymers	Other		
East Coast	-------	1	65	30	541	-------	125	2,555	486	3,803
Appalachian No. 1	-------	104	10	-------	33	-------	-------	397	56	600
Appalachian No. 2	-------	-------	-------	28	-------	-------	-------	-------	-------	28
Indiana, Illinois, Kentucky, etc	-------	71	-------	313	263	17	62	53	388	1,167
Minnesota, Wisconsin, North Dakota, and South Dakota	-------	-------	-------	-------	-------	-------	-------	62	-------	62
Oklahoma, Kansas, etc	85	474	-------	-------	320	30	-------	-------	145	1,054
Texas Inland	513	-------	-------	-------	523	-------	100	-------	15	1,151
Texas Gulf Coast	60	403	-------	24	10	-------	1,303	4,646	2,336	8,782
Louisiana Gulf Coast	435	2	-------	29	11	-------	151	433	2,504	3,565
Arkansas - Louisiana Inland	347	-------	-------	-------	5	-------	229	-------	94	675
Rocky Mountain and New Mexico	170	-------	-------	-------	49	-------	-------	-------	267	486
West Coast	45	19	32	73	384	87	-------	2,112	1,727	4,479
Total	1,655	1,074	107	497	2,139	134	1,970	10,258	8,018	25,852

Unfinished Oils.—Unfinished oils include all oils, which will be cracked or further distilled with the exception of the unfinished gasoline part of naphtha distillate. Unfinished oils are ordinarily rerun and become finished products.

INTERCOASTAL SHIPMENTS

Crude oil and products moved from the gulf coast to the east coast comprise most of intercoastal shipments. Some petroleum shipments are moved from the west coast to gulf and east coast ports and from the gulf coast to the west coast, but the volume is small.

Shipments from the gulf to the east coast in 1960 totaled 694.4 million barrels, a 4.0 percent gain over 1959. Gasoline represented 35.2 percent of the volume of the gulf-east coast shipments; distillate fuel oil, 25.0 percent; and crude oil, 23.1 percent.

Coastwise shipments from the west coast through the Panama Canal totaled 12.7 million barrels in 1960 and shipments from the gulf to the west coast totaled 3.4 million barrels.

TABLE 84.—Petroleum oils, crude and refined, shipped commercially from gulf coast to east coast ports of the United States, 1959–60, by classes [1]

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1959:													
Crude petroleum	18, 081	17, 949	17, 769	15, 702	10, 462	8, 826	14, 740	14, 945	10, 737	10, 677	12, 694	14, 205	166, 787
Gasoline	17, 042	17, 027	17, 777	21, 094	19, 858	21, 636	21, 053	21, 600	17, 542	17, 692	17, 856	19, 051	229, 228
Kerosine	6, 154	3, 799	2, 782	2, 355	2, 263	2, 420	3, 662	3, 467	2, 972	3, 452	4, 056	4, 775	42, 157
Distillate fuel oil	20, 085	16, 712	16, 529	13, 352	12, 800	11, 893	10, 869	12, 714	10, 540	10, 721	14, 186	17, 418	167, 819
Residual fuel oil	3, 501	3, 392	2, 880	3, 725	3, 570	2, 867	3, 067	3, 152	3, 635	4, 106	4, 508	5, 027	43, 430
Lubricating oils	604	430	641	743	746	667	749	530	638	827	673	663	7, 911
Miscellaneous oils	718	604	720	874	1, 008	904	516	1, 340	1, 404	561	689	985	10, 323
Total	66, 185	59, 913	59, 098	57, 845	50, 707	49, 213	54, 656	57, 748	47, 468	48, 036	54, 662	62, 124	667, 655
1960:													
Crude petroleum	15, 105	11, 740	14, 680	12, 652	13, 371	11, 836	14, 152	13, 501	13, 037	12, 589	12, 786	15, 049	160, 498
Gasoline	20, 576	18, 101	17, 953	20, 603	22, 704	20, 045	21, 464	21, 535	19, 512	21, 576	20, 790	19, 868	244, 727
Kerosine	5, 242	3, 762	4, 116	2, 801	2, 285	2, 991	3, 212	3, 696	3, 211	3, 954	4, 089	4, 727	44, 086
Distillate fuel oil	19, 934	15, 879	16, 173	11, 765	12, 219	11, 506	10, 451	12, 678	11, 938	15, 486	16, 449	19, 032	173, 510
Residual fuel oil	3, 830	3, 598	3, 468	4, 734	4, 318	3, 983	3, 841	3, 681	4, 074	4, 650	5, 050	4, 846	50, 073
Lubricating oils	638	549	652	593	648	686	815	651	519	816	637	580	7, 784
Miscellaneous oils	852	772	852	1, 472	1, 980	1, 171	1, 162	1, 176	1, 100	1, 182	956	1, 018	13, 693
Total	66, 177	54, 401	57, 894	54, 620	57, 525	52, 218	55, 097	56, 918	53, 391	60, 253	60, 757	65, 120	694, 371

[1] Source: Office of Oil and Gas, U.S. Department of the Interior.

FOREIGN TRADE

Foreign trade statistics in this section, as reported by the U.S. Department of Commerce, differ slightly from those used in other sections of this chapter. Imports of crude petroleum and unfinished oils (table 85) are obtained from petroleum refining companies to be consistent with the refinery balance; therefore, they may differ from the totals reported by the Commerce Department. The Bureau of Mines import data excludes all imports from foreign sources to U.S. territories and possessions and include as exports all petroleum shipments to these territories and possessions from the United States.

Imports.—According to Commerce Department data, imports of crude petroleum and petroleum products totaled 686.7 million barrels in 1960, compared with 674.2 million in 1959. Receipts from Canada and Mexico supplied 11.9 million barrels of the increase in imports for 1960. Overland imports from these two countries are exempt from the mandatory import control program.

While the total residual fuel oil imported in 1960 was above the 1959 level, the quantity imported for onshore use was much less than the previous year. Residual imported duty free for use as bunker fuel for vessels engaged in foreign trade furnished the increase.

Exports.—Total exports, excluding shipments to the territories, continued to decline in 1960. Exports of the principal products, gasoline, kerosine, distillate and residual fuel oil were 9.0 million barrels less in 1960, but exports of the other products were 5.0 million barrels more than in 1959.

TABLE 85.—Petroleum oils, crude and refined, imported into the United States, 1959–60, by months [1]

(Thousand barrels)

Year and class	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1959: [2]													
Crude petroleum	28,664	29,467	28,113	22,270	29,089	36,147	27,510	29,943	29,486	30,355	29,421	31,879	352,344
Refined products:													
Gasoline	1,174	1,381	2,363	838	417	1,367	422	534	908	830	1,489	1,635	13,358
Kerosine	------	------	113	------	------	------	------	------	1	------	------	------	114
Distillate fuel oil	1,650	1,674	3,505	1,877	811	1,801	1,055	818	1,181	675	822	1,789	17,658
Residual fuel oil	26,241	26,476	31,394	15,066	14,293	14,734	12,122	12,211	14,377	12,867	20,311	22,479	222,571
Jet fuel	2,201	1,215	851	1,307	480	515	952	697	2,285	643	994	1,432	13,572
Wax	1	------	2	1	3	------	1	5	2	3	2	1	21
Asphalt	690	319	643	379	295	914	681	945	730	554	308	411	6,869
Miscellaneous	------	------	------	------	------	------	------	------	------	------	------	4	4
Unfinished oils	4,681	5,795	1,870	698	1,018	1,611	2,024	1,387	1,242	1,079	793	874	23,072
Total refined	36,638	36,860	40,741	20,166	17,317	20,942	17,257	16,597	20,726	16,651	24,719	28,625	297,239
Total crude and refined	65,302	66,327	68,854	42,436	46,406	57,089	44,767	46,540	50,212	47,006	54,140	60,504	649,583
1960: [3]													
Crude petroleum	28,610	29,730	29,292	33,877	30,571	32,730	31,191	32,768	32,691	31,458	29,980	28,677	371,575
Refined products:													
Gasoline	257	635	467	661	571	1,254	1,037	948	1,396	840	781	943	9,790
Kerosine	------	------	------	------	------	------	------	------	18	------	39	29	86
Distillate fuel oil	1,610	1,095	1,229	1,520	1,342	1,148	796	773	1,005	897	621	1,097	13,133
Residual fuel oil	26,366	24,649	25,790	19,567	15,590	17,098	13,955	14,966	15,523	15,976	21,885	22,780	234,145
Liquefied petroleum gases [4]	164	166	119	151	161	133	61	69	96	123	225	163	1,631
Jet fuel	608	1,415	863	580	1,552	1,289	1,262	880	782	907	1,117	1,383	12,638
Wax	1	1	2	------	1	1	------	------	------	------	------	------	6
Asphalt	444	196	220	609	292	1,179	636	564	542	486	546	408	6,122
Miscellaneous	------	5	1	2	2	8	18	1	14	12	2	4	69
Unfinished oils	1,263	1,215	1,275	1,524	1,200	1,373	1,786	1,292	1,258	1,748	1,448	1,096	16,478
Total refined	30,713	29,377	29,966	24,614	20,711	23,483	19,551	19,493	20,634	20,989	26,664	27,903	294,098
Total crude and refined	59,323	59,107	59,258	58,491	51,282	56,213	50,742	52,261	53,325	52,447	56,644	56,589	665,673

[1] Imports of crude reported to the Bureau of Mines; imports of refined products compiled from records of the U.S. Department of Commerce.

[2] Includes Alaska as part of the United States; there were no Hawaiian imports for 1959.

[3] Includes Alaska and Hawaii.

[4] Prior to 1960 imports of liquefied petroleum gases were not collected separately but were included with gasoline imports.

TABLE 86.—Crude petroleum and petroleum products imported for consumption into the United States, 1959–60, by country [1]

(Thousand barrels)

Country	Crude petroleum	Gasoline [2]	Kerosine [3]	Distillate oils [4]	Residual oil [4]	Asphalt	Unfinished oil	Miscellaneous oils [5]	Total
1959:									
North America:									
Canada	33,902	1,189		241	521	(6)	152	(6)	36,005
Cuba		65		78	1,863				2,006
Mexico	229			239	[7] 12,492			19	[7] 12,979
Netherlands Antilles	[7] 812	[7] 14,763	12	[7] 6,993	[7] 92,644	4,190	[7] 3,359	4	122,777
Trinidad and Tobago	92	1,133		425	7,180	128	3,317		12,275
Other North America					13				13
Total	[7] 35,035	[7] 17,150	12	[7] 7,976	[7] 114,713	4,318	[7] 6,828	23	[7] 186,055
South America:									
Brazil	1,012				99				1,111
Colombia	11,525			1	502				12,028
Venezuela	195,240	3,307	113	[7] 6,702	[7] 100,590	2,663	9,618	(6)	[7] 318,233
Other South America						1		(6)	1
Total	207,777	3,307	113	[7] 6,703	[7] 101,191	2,664	9,618	(6)	[7] 331,373
Europe:									
Italy		139		24	877		403	(6)	1,443
United Kingdom		(6)	(6)		407			(6)	407
Other Europe		(6)		15	154	(6)		(6)	169
Total		139	(6)	39	1,438	(6)	403	(6)	2,019
Asia:									
Bahrein		132		38	265				435
Indonesia	24,235								24,235
Iran	9,699								9,699
Iraq	8,541								8,541
Japan		262					998	2	1,262
Kuwait	72,201	150			5,706		5,280		83,337
Qatar [8]	[7] 733								[7] 733
Saudi Arabia	[7] 26,187	36			93				[7] 26,316
Other Asia	189								189
Total	[7] 141,785	580		38	6,064		6,278	2	[7] 154,747
Africa: Canary Islands					8				8
Grand total	[7] 384,597	[7] 21,176	125	[7] 14,756	[7] 223,414	6,982	[7] 23,127	25	[7] 674,202
Shipments from noncontiguous Territories to the United States: Puerto Rico [9]		6,531	1	2,910	4,567				14,009
Imports into noncontiguous Territories from foreign countries: Puerto Rico	24,082	718	12	13	1,286	113	3,235		29,459
Total net imports into the United States	[7] 360,515	[7] 26,989	114	[7] 17,653	[7] 226,695	6,869	[7] 19,892	25	[7] 658,752
1960:									
North America:									
Canada	40,866	2,582	1	131	397	1	93	5	44,076
Cuba					181	1			182
Mexico	766				5,037			5	5,808
Netherlands Antilles	2,021	8,253	2	4,340	94,310	3,716	3,638	47	116,327
Trinidad and Tobago	219	3,401			12,261	19	2,019		17,919
Other North America					202				202
Total	43,872	14,236	3	4,471	112,388	3,737	5,750	57	184,514
South America:									
Brazil	309				107	(6)			416
Colombia	15,489				15				15,504
Venezuela	200,528	4,151	67	5,320	113,686	2,504	7,333		333,589
Other South America						(6)			(6)
Total	216,326	4,151	67	5,320	113,808	2,504	7,333		349,509

See footnotes at end of table.

TABLE 86.—Crude petroleum and petroleum products imported for consumption into the United States, 1959–60, by country [1]—Continued

(Thousand barrels)

Country	Crude petroleum	Gasoline [2]	Kerosine [3]	Distillate oils [4]	Residual oil [4]	Asphalt	Unfinished oil	Miscellaneous oils [5]	Total
1960—Continued									
Europe:									
Italy	------	(6)	------	------	65	16	178	------	259
United Kingdom	------	(6)	(6)	(6)	------	------	(6)	6	6
Other Europe	------	29	------	1	41	(6)	(6)	13	84
Total	------	29	(6)	1	106	16	178	19	349
Asia:									
Bahrein	------	------	------	------	1,436	------	------	------	1,436
Indonesia	28,054	------	------	------	------	------	------	(6)	28,054
Iran	11,170	------	------	------	1	------	1,267	------	12,438
Iraq	7,927	------	------	------	------	------	------	------	7,927
Japan	------	244	------	------	119	------	1,515	------	1,878
Kuwait	60,402	151	------	------	1,706	------	4,343	------	66,602
Qatar [8]	1,408	------	------	------	1	------	------	------	1,409
Saudi Arabia	29,989	37	------	------	716	------	44	------	30,786
Other Asia	239	22	------	------	115	------	------	------	376
Total	139,189	454	------	------	4,094	------	7,169	(6)	150,906
Africa:									
Algeria	284	------	------	------	------	------	------	------	284
United Arab Republic (Egypt region)	1,175	------	------	------	------	------	------	------	1,175
Total	1,459	------	------	------	------	------	------	------	1,459
Grand total	400,846	18,870	70	9,792	230,396	6,257	20,430	76	686,737
Shipments from noncontiguous Territories to the United States: Puerto Rico	------	5,937	------	3,003	4,100	------	------	------	13,040
Imports into noncontiguous Territories from foreign countries: Puerto Rico	26,537	1,012	(6)	23	1,287	119	2,789	(6)	31,767
Total net imports into the United States	374,309	23,795	70	12,772	233,209	6,138	17,641	76	668,010

[1] Compiled by Mae B. Price and Elsie D. Jackson, of the Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.
[2] Includes jet fuel liquified gases and naphtha, but excludes benzol (1959: 1,365,000 barrels; 1960: 907,791).
[3] 1960 includes quantities imported free for supplies of vessels and aircraft; assumed to be commercial jet fuel by Bureau of Mines.
[4] Includes some quantities imported free for manufacture in bond and export and for vessels and aircraft.
[5] Includes some quantities imported free for supplies of vessels and aircraft.
[6] Less than 1,000 barrels.
[7] Revised figure.
[8] Assumed source; classified in import statistics under "Arabia Peninsular States, n.e.c."
[9] As reported to Bureau of Mines by shipping companies.

Source: Bureau of the Census.

TABLE 87.—Petroleum oils, crude and refined, shipped from the United States, including shipments to Territories and possessions, by classes and months [1]

Year and Class	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1959: [2]													
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2,526
Refined products:													
Gasoline [3]	1,699	1,514	1,379	2,216	2,081	1,724	2,004	1,555	1,741	1,717	1,414	1,842	20,886
Kerosine	76	26	42	33	23	71	41	77	155	47	52	387	1,030
Distillate fuel oil	1,273	843	1,430	965	1,105	1,251	906	1,682	989	865	851	1,195	13,355
Residual fuel oil	3,234	2,345	2,703	2,572	1,950	2,499	2,145	1,554	1,887	2,403	1,339	1,409	26,040
Jet fuel	-------	35	14	1	27	5	2	72	14	78	62	79	389
Lubricants	1,053	957	1,178	1,404	1,185	1,224	1,278	1,160	1,030	1,265	859	1,483	14,076
Paraffin wax	72	82	96	85	92	95	82	75	93	76	86	100	1,034
Coke	431	197	304	334	383	433	436	407	447	496	354	458	4,680
Asphalt	70	63	128	62	94	73	112	75	85	118	90	64	1,034
Liquefied gases	205	172	188	192	166	196	179	188	160	201	187	218	2,252
Miscellaneous oils	25	18	18	24	27	19	25	25	27	19	17	29	273
Total refined	8,138	6,252	7,480	7,888	7,133	7,590	7,210	6,870	6,628	7,285	5,311	7,264	85,049
Total crude and refined	8,490	6,349	7,658	8,118	7,400	7,782	7,384	7,107	6,779	7,543	5,443	7,522	87,575
1959: [4]													
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2,526
Refined products:													
Gasoline [3]	1,329	1,276	1,150	1,795	1,731	1,325	1,690	1,070	1,485	1,283	1,094	1,515	16,743
Kerosine	57	26	30	26	23	63	34	70	147	45	45	378	944
Distillate fuel oil	1,245	808	1,423	914	1,076	1,190	841	1,604	951	790	717	1,175	12,734
Residual fuel oil	2,873	1,862	2,288	2,005	1,525	2,133	1,871	1,008	1,417	2,033	842	958	20,815
Jet fuel	-------	35	1	-------	-------	-------	-------	50	-------	30	16	41	173
Lubricants	1,047	949	1,172	1,401	1,171	1,211	1,270	1,150	1,019	1,256	848	1,478	13,972
Paraffin wax	72	82	95	84	91	95	82	75	93	76	86	100	1,031
Coke	431	197	304	334	383	433	436	407	447	496	354	458	4,680
Asphalt	60	63	114	56	83	71	97	75	73	113	71	59	935
Liquefied gases	205	172	188	192	166	196	179	188	160	201	187	218	2,252
Miscellaneous oils	25	18	17	20	26	18	24	24	26	18	17	29	262
Total refined	7,344	5,488	6,782	6,827	6,275	6,735	6,524	5,721	5,818	6,341	4,277	6,409	74,541
Total crude and refined	7,696	5,585	6,960	7,057	6,542	6,927	6,698	5,958	5,969	6,599	4,409	6,667	77,067

1960: [5]													
Crude petroleum	264	299	260	270	127	436	248	89	234	352	----------	512	3,091
Refined products:													
Gasoline [3]	916	914	1,284	1,607	1,436	1,307	1,115	1,160	1,107	1,130	747	745	13,468
Kerosine	106	93	76	35	76	19	26	157	7	18	11	63	687
Distillate fuel oil	789	981	998	779	1,176	1,163	916	751	484	580	556	641	9,814
Residual fuel oil	1,728	1,685	1,767	1,688	1,484	1,967	875	1,888	1,357	1,283	1,304	1,515	18,541
Jet fuel	57	----------	1	----------	----------	1	20	4	10	----------	20	----------	113
Lubricants	1,196	1,040	1,333	1,422	1,318	1,559	1,478	1,088	1,258	1,386	1,353	1,389	15,820
Paraffin wax	99	110	105	93	109	116	91	116	118	130	122	124	1,333
Coke	558	396	428	493	528	693	868	431	656	753	654	398	6,856
Asphalt	34	59	74	91	56	87	65	72	136	97	81	69	921
Liquefied gases	232	206	214	246	219	222	262	251	240	244	295	357	2,988
Miscellaneous oils	19	21	22	23	19	21	26	20	20	20	21	25	257
Total refined	5,734	5,505	6,302	6,477	6,421	7,155	5,742	5,938	5,393	5,641	5,164	5,326	70,798
Total crude and refined	5,998	5,804	6,562	6,747	6,548	7,591	5,990	6,027	5,627	5,993	5,164	5,838	73,889

[1] Compiled from records of U.S. Department of Commerce.
[2] Includes shipments to Hawaii compiled from Bureau of Mines data.
[3] Includes benzol, naphtha, natural gasoline, and antiknock compounds.
[4] For comparison with 1960, excludes shipments to Hawaii.
[5] Prelininary figures.

TABLE 88.—Crude petroleum and petroleum products exported from the United States by country of destination, and shipments to and exports from territories and possessions [1]

(Thousand barrels)

Country	Crude petroleum	Gasoline [2] [3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [3]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [2]	Total
1959:													
North America:													
Canada	(4)	3,696	661	[5] 3,364	4,946	1,207	116	90	166	1,626	14	175	[5] 16,061
Cuba	----	114	----	40	83	238	3	89	30	(4)	2	14	613
El Salvador	----	12	----	----	129	20	----	----	8	----	1	2	172
Mexico	21	3,232	127	512	1,810	130	269	2,023	142	(4)	10	42	8,318
Netherlands Antilles	----	53	----	267	1,177	18	----	----	1	----	(4)	(4)	1,516
Other North America	----	260	17	143	778	316	49	32	56	----	9	17	1.677
Total	21	7,367	805	[5] 4,326	8,923	1,929	437	2,234	403	1,626	36	250	[5] 28,357
South America:													
Argentina	----	5	----	1	----	29	1	2	1	----	----	(4)	39
Brazil	----	69	----	100	----	1,170	2	----	51	27	10	1	1,430
Chile	----	1	1	20	863	167	56	----	25	----	1	11	1,145
Colombia	----	80	----	----	19	186	(4)	1	104	----	3	8	401
Peru	----	868	----	----	99	98	(4)	----	22	----	1	9	1,097
Venezuela	----	175	----	----	----	256	5	2	20	----	2	26	486
Other South America	----	4	----	(4)	----	105	3	----	34	(4)	2	7	155
Total	----	1,202	1	121	981	2,011	67	5	257	27	19	62	4,753
Europe:													
Belgium-Luxembourg	----	76	1	9	152	720	1	(4)	9	247	4	7	1,226
France	550	883	----	(4)	----	60	1	----	35	236	4	2	1,771
Germany, West	----	356	6	----	624	370	(4)	3	19	1	10	2	1,391
Italy	----	939	----	1	----	272	2	(4)	17	341	6	10	1,588
Netherlands	----	131	1	----	----	404	(4)	(4)	28	60	10	9	643
Sweden	----	167	1	28	627	296	(4)	----	8	34	2	8	1,171
United Kingdom	405	1,280	90	2,723	1,251	1,108	(4)	(4)	59	49	31	1	6,997
Other Europe	----	764	(4)	89	81	[5] 695	5	(4)	33	568	9	31	[5] 2,275
Total	955	4,596	99	2,850	2,735	[5] 3,925	9	3	208	1,536	76	70	[5] 17,062
Asia:													
India	----	43	(4)	----	----	706	6	----	1	52	13	40	861
Indonesia	----	214	----	----	----	160	3	----	5	----	12	1	395
Japan-Nansei and Nanpo Islands	1,548	207	1	5,241	8,250	1,093	5	4	22	1,288	29	13	17,701
Malaya and Singapore	----	235	----	(4)	----	61	(4)	----	----	----	2	2	300
Philippines	----	117	(4)	----	----	411	84	----	12	----	15	15	654
Turkey	----	333	----	----	----	289	----	----	2	----	1	18	643
Other Asia	----	463	1	----	71	975	15	1	70	27	20	43	1,686
Total	1,548	1,612	2	5,241	8,321	3,695	113	5	112	1,367	92	132	22,240

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Africa:													
Belgian Congo	----------	33	2	----------	15	82	27	----------	----------	----------	(4)	4	163
French West Africa and Republic of Togo	----------	4	3	5	98	9	4	----------	----------	----------	(4)	1	124
Union of South Africa	----------	22	1	----------	----------	440	85	----------	34	----------	22	17	621
United Arab Republic (Egypt region)	----------	173	(4)	----------	----------	234	----------	----------	(4)	----------	(4)	7	414
Other Africa	----------	450	8	73	138	229	63	----------	2	75	4	19	1,061
Total	----------	682	14	78	251	994	179	----------	36	75	26	48	2,383
Oceania:													
Australia	----------	16	2	12	102	802	(4)	----------	11	49	8	1	1,003
French Pacific Islands	----------	38	9	66	6	6	1	1	----------	----------	----------	(4)	127
New Zealand	----------	4	1	----------	----------	122	1	2	4	----------	3	----------	137
Other Oceania	----------	1	1	4	----------	(4)	6	1	----------	----------	----------	(4)	13
Total	----------	59	13	82	108	930	8	4	15	49	11	1	1,280
Grand total	2,524	15,518	934	[5] 12,698	21,319	[5] 13,484	813	2,251	1,031	4,680	260	563	[5] 76,075
Shipments from the United States to Territories and possessions:													
Hawaii [6]	----------	4,144	86	624	5,225	104	99	----------	3	----------	(7)	227	10,512
Puerto Rico	(7)	401	100	----------	(7)	87	99	(7)	(7)	(7)	(7)	6	693
Wake	(7)	855	(4)	12	(7)	(4)	2	(7)	(7)	(7)	(7)	(4)	869
Other	(7)	94	14	104	(7)	3	20	(7)	(7)	(7)	(7)	(4)	235
Total	----------	5,494	200	740	5,225	194	220	----------	3	----------	(7)	233	[6] 12,309
Exports from noncontiguous Territories and possessions to foreign countries:													
Hawaii	----------	(4)	----------	3	----------	----------	----------	----------	----------	----------	----------	----------	3
Puerto Rico	----------	113	2	77	503	(4)	(4)	----------	----------	----------	----------	----------	695
Total	----------	113	2	80	503	(4)	(4)	----------	----------	----------	----------	----------	698
Total net shipments from the United States	2,524	20,899	1,132	[5] 13,358	26,041	[5] 13,678	1,033	2,251	1,034	4,680	260	796	[5 6] 87,686

See footnotes at end of table.

TABLE 88.—Crude petroleum and petroleum products exported from the United States by country of destination, and shipments to and exports from Territories and possessions—Continued

Country	Crude petroleum	Gasoline [3]	Kerosine	Distillate oil	Residual oil	Lubricating oil	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products	Total
1960:													
North America:													
Canada	(4)	2,685	196	1,865	4,004	1,232	74	125	148	2,225	13	55	12,622
Cuba	(4)	34	---	---	---	130	(4)	29	31	---	2	8	234
El Salvador	---	5	(4)	---	40	21	1	---	7	---	1	2	77
Mexico	(4)	2,299	63	224	553	132	283	2,663	173	(4)	12	26	6,428
Netherlands Antilles	---	1,856	---	---	---	16	(4)	---	(4)	---	(4)	(4)	1,872
Other North America	---	116	14	118	324	310	79	73	76	(4)	7	15	1,132
Total	(4)	6,995	273	2,207	4,921	1,841	437	2,890	435	2,225	35	106	22,365
South America:													
Argentina	---	(4)	129	(4)	---	23	1	91	1	---	(4)	(4)	245
Brazil	---	57	7	38	---	1,300	1	---	89	47	12	2	1,553
Chile	---	(4)	(4)	---	305	219	87	---	24	---	1	10	646
Colombia	---	4	---	(4)	---	187	1	(4)	147	---	8	7	349
Peru	---	338	---	---	40	126	1	---	20	---	1	9	535
Venezuela	---	289	(4)	(4)	---	224	4	(4)	15	(4)	3	8	543
Other South America	---	6	(4)	1	---	173	32	(4)	38	---	2	13	265
Total	---	694	136	39	345	2,252	127	91	334	47	22	49	4,136
Europe:													
Belgium-Luxembourg	---	40	1	---	---	785	1	---	12	276	3	10	1,128
France	568	566	---	(4)	106	53	(4)	(4)	42	251	4	1	1,591
Germany, West	---	32	12	5	271	463	(4)	(4)	111	163	10	4	1,071
Italy	---	985	(4)	---	249	438	2	1	15	474	3	17	2,184
Netherlands	---	209	1	988	184	515	(4)	---	40	99	12	9	2,057
Sweden	---	19	(4)	---	127	398	1	(4)	8	36	3	9	601
United Kingdom	433	523	72	196	1,628	1,236	1	(4)	75	77	31	1	4,273
Other Europe	---	479	(4)	46	58	856	7	---	52	806	8	19	2,331
Total	1,001	2,853	86	1,235	2,623	4,744	12	1	355	2,182	74	70	15,236
Asia:													
India	---	59	1	---	---	873	8	(4)	1	48	18	7	1,015
Indonesia	---	395	---	160	---	169	1	---	1	---	5	1	732
Japan-Nansei and Nanpo Islands	2,086	298	5	5,976	10,313	1,569	8	1	40	2,160	28	114	22,598
Malaya and Singapore	---	(4)	---	---	---	89	(4)	---	1	---	4	5	99
Philippines	---	37	53	17	---	348	11	---	8	---	10	16	500
Turkey	---	146	1	---	---	392	5	---	2	---	(4)	8	554
Other Asia	---	210	(4)	---	---	1,049	25	(4)	100	40	17	62	1,503
Total	2,086	1,145	60	6,153	10,313	4,489	58	1	153	2,248	82	213	27,001

Africa:													
Congo, Republic of the and Ruanda-Urandi [8]	----------	4	1	----------	----------	59	6	----------	----------	(4)	(4)	3	73
Union of South Africa	----------	13	(4)	----------	100	479	97	(4)	38	----------	25	18	770
United Arab Republic (Egypt region)	----------	25	----------	----------	----------	256	(4)	----------	(4)	----------	(4)	19	300
Western Africa, n.e.c.[9]	----------	42	1	8	91	11	6	----------	----------	----------	(4)	1	160
Other Africa	----------	541	9	(4)	6	301	38	(4)	5	102	8	19	1,029
Total	----------	625	11	8	197	1,106	147	(4)	43	102	33	60	2,332
Oceania:													
Australia	----------	1	2	3	291	727	1	----------	11	54	9	2	1,101
French Pacific Islands	----------	63	19	114	1	6	(4)	2	----------	----------	----------	(4)	205
New Zealand	----------	4	1	----------	----------	155	1	3	3	----------	3	(4)	170
Other Oceania	----------	(4)	2	1	4	(4)	4	1	----------	----------	----------	(4)	12
Total	----------	68	24	118	296	888	6	6	14	54	12	2	1,488
Grand total	3,087	12,380	590	9,760	18,695	15,320	787	2,989	1,334	6,858	258	500	72,558
Shipments from the United States to Territories and possessions:													
Puerto Rico	----------	171	89	(4)	(7)	95	126	(7)	(7)	(7)	(7)	6	487
Wake	----------	718	(4)	39	(7)	(4)	1	(7)	(7)	(7)	(7)	(4)	758
Other	----------	252	16	138	(7)	8	9	(7)	(7)	(7)	(7)	(4)	423
Total	----------	1,141	105	177	(7)	103	136	(7)	(7)	(7)	(7)	6	1,668
Exports from Territories to foreign countries: Puerto Rico	----------	66	7	123	202	(4)	1	(4)	----------	----------	----------	(4)	399
Total net shipments from the United States	3,087	13,455	688	9,814	18,493	15,423	922	2,989	1,334	6,858	258	506	73,827

[1] Compiled by Mae B. Price and Elsie D. Jackson, of the Bureau of Mines, from records of the Bureau of the Census.
[2] Country and continent data include complete distribution of classes formerly not published for security reasons.
[3] Includes naphtha but excludes benzol: 1959, 174,000 barrels; 1960, 561,000 barrels.
[4] Less than 1,000 barrels.

Source: Bureau of the Census.

[5] Revised figure.
[6] Figures represent shipments from refining companies through Pacific coast ports, as reported to Bureau of Mines by shippers.
[7] Not separately classified.
[8] Effective July 1, 1960; formerly Belgian Congo.
[9] Effective July 1, 1960; formerly French West Africa and Republic of Togo.

WORLD SUPPLY AND DEMAND

PETROLEUM [5]

Production of crude petroleum in the free world in 1960 increased 6.6 percent to 6,474 million barrels. Output of refined products increased 7.6 percent to 6,785 million barrels, and demand for refined products rose 7.7 percent to 6,723 million barrels, according to the Bureau of Mines. Within the Sino-Soviet bloc, estimated crude production during the year was 1,210 million barrels, or 14.3 percent above 1959; output of refined products was 1,142 million barrels, an increase of 12.0 percent; and demand for refined products was 1,052 million barrels, or 10.6 percent above the preceding year.

About 84 percent of world crude production in 1960 was in the free world and 16 percent in the Sino-Soviet bloc. Western Hemisphere crude production, representing about two-thirds of the free world total, increased less than 2 percent in 1960. In the United States, reduction of petroleum stocks and increasing competition from imports and natural gas held domestic production to the 1959 level. Canadian output increased 8 million barrels and Mexican output, 3 million barrels during the year. In South America, the relatively modest expansion in crude production was mainly in Venezuela and Argentina where output rose 30 million barrels and 19 million barrels, respectively.

In contrast, crude production in the Eastern Hemisphere in 1960 rose an impressive 16.2 percent and supplied about one-third of the free world total. Middle East output increased 243 million barrels with significant expansion in the four major producing countries—Kuwait, Saudi Arabia, Iran, and Iraq. In Africa, French Sahara output continued its rapid rise, reaching a total of 67 million barrels, compared with 10 million barrels in 1959. There was also expansion in Egypt and Nigeria, but no commercial production in Libya. Output is scheduled to begin in Libya in 1961 when pipelines under construction are completed. In South Asia, Indonesian production was up 14 million barrels, or 10 percent in 1960, while output from limited reserves in British Borneo was down 15 percent, or 6 million barrels below 1959. In the Sino-Soviet bloc, an estimated increase of 151 million barrels in crude production in 1960 was mainly in the U.S.S.R. Output of 1,080 million barrels in that country exceeded Venezuela and ranked second in world production after the United States.

Movements of crude petroleum within the free world in 1960 were about 12 percent above 1959. Net shipments from the Soviet bloc to the free world during the year are estimated at 54 million barrels, or 13 million barrels more than in 1959. (The apparent gap between total imports in the free world and exports and reexports in 1960 reflects these Soviet bloc crude shipments.)

In Western Europe, crude receipts rose 169 million barrels, or 16 percent in 1960, reflecting expanding refinery activity in the area, particularly in West Germany, Italy, the Netherlands, and the United Kingdom. In the South Asia-Far East-Oceania area, receipts

[5] J. V. Hightower, Commodity-Industry Analyst.

were up 76 million barrels, or 27 percent. Most of this went to Japan, which imported a total of 196 million barrels during the year. There were also significant increases in imports into Australia and India. In the Western Hemisphere, United States imports increased 19 million barrels or 5.4 percent, and Canadian imports were up 10 million barrels or 9 percent. Area receipts in South America declined 2 percent or 8 million barrels, mainly owing to reductions in Argentina, the Netherlands Antilles, and Brazil. Trinidad imports increased 9 million barrels during the year.

Stimulated by expanding markets in Europe and the Far East, Middle East crude shipments in 1960 were up 200 million barrels or 14 percent. African shipments increased 56 million barrels or 244 percent mainly from the French Sahara. In South Asia, shipments rose 13 million barrels or 14 percent mainly from Indonesia, while British Borneo exports continued to decline. In the Western Hemisphere, there was no appreciable change in shipments from 1959. A modest increase of 1.0 percent or 12 million barrels occurred in South American exports, mainly Venezuela and Colombia, while Canadian exports rose 9 million barrels or 27 percent.

The free world supplied 86 percent of the world output of refined products in 1960 and the Sino-Soviet bloc, 14 percent. The gain of 482 million barrels in free world output during the year was chiefly in the Eastern Hemisphere. In Western Europe output rose 196 million barrels, mainly in West Germany, the United Kingdom, Italy, and France. Middle East output increased 54 million barrels, mainly in Saudi Arabia, Iraq and Iran. In the South Asia, Far East and Oceania area, output was up 84 million barrels, chiefly in Japan, with significant gains in Australia and India as well. In the Sino-Soviet bloc, most of the estimated increase of 122 million barrels in refined products output in 1960 was in the U.S.S.R.

Among the major refined products in 1960, free world output of gasoline rose 4 percent to 2,259 million barrels; kerosine and jet fuel, 10 percent to 472 million barrels; distillate fuel oil, 2 percent to 1,353 million barrels; residual fuel oil, 13 percent to 1,784 million barrels; lubricants and grease, 7 percent to 91 million barrels; and other refined products, 9 percent to 615 million barrels.

The total of 1,197 million barrels of refined products imported by free world countries in 1960 is believed to be understated. Actual imports are considered to have been about 1,433 million barrels. This estimate is based on total exports and reexports within the free world of 1,342 million barrels and estimated deliveries of 91 million barrels for the Soviet bloc. Understated imports are due in part to the failure of many countries to report in their trade statistics entries or withdrawals from bond and military receipts.

Western European imports of products in 1960 were 53 million barrels or 14 percent greater than in 1959; the increase was mostly residual fuel oil. In the South Asia-Far East-Oceania area, imports were up 15 million barrels, or 9 percent; most of this went to Japan. Imports by free world countries from the Soviet bloc in 1960 are estimated at 91 million barrels or 21 million barrels greater than in 1959. In the Western Hemisphere, South American imports declined 10 percent or 8 million barrels, mainly in the Netherlands Antilles and Argentina.

On the export side, product movements in South America were up 72 million barrels in 1960, or 15 percent, principally from Venezuela and Trinidad, with a decline in shipments from the Netherlands Antilles. In the United States, product shipments declined 14 million barrels or 17 percent. In Western Europe, exports were up 50 million barrels or 20 percent above 1959. Middle East shipments rose 41 million barrels or 18 percent above 1959.

Based on reported or calculated apparent domestic demand in individual countries, total world demand for refined products in 1960 was 7,775 million barrels. Of this 86 percent was in the free world and 14 percent in the Sino-Soviet bloc.

The United States with 34 percent of world crude production in 1960 furnished 46 percent of world demand for refined products. During the year the country's domestic demand increased 103 million barrels. Demand rose in South America 12 million barrels, expanding in most of the countries. Western European demand rose 212 million barrels; the increase was mostly in West Germany, France, and the United Kingdom. In the South Asia-Far East-Oceania area, demand increased 88 million barrels; most of the gain was in Japan, where demand rose 48 percent, and India, where demand rose 23 percent. Among the major products in free world demand in 1960, gasoline rose 4 percent to 2,228 million barrels; kerosine and jet fuel, 12 percent to 439 million barrels; distillate fuel oil, 9 percent to 1,327 million barrels; residual fuel oil, 9 percent to 1,732 million barrels; lubricants and grease, 8 percent to 91 million barrels; and other products including petrochemical offtake, 9 percent to 696 million barrels.

The new supply of refined products in the free world in 1960, including refinery fuel and loss, is estimated at 7,100 million barrels or 9 percent greater than in 1959. Estimated new supply of refined products is calculated from the free world output of 6,785 million barrels plus 91 million barrels of products shipped to the free world from the Soviet bloc plus 174 million barrels of natural-gas liquids produced in the United States and used directly for chemicals and fuels but not included in refinery output plus an estimated 50 million barrels of similar natural-gas liquids in other free world countries. The gap of 377 million barrels between the estimated new supply of 7,100 million barrels and the demand of 6,723 million barrels is attributed to understated imports (estimated at 236 million barrels in 1960) and calculation of demand in a number of countries on an apparent basis with no account of stock changes.

TABLE 89.—World production of crude petroleum by countries [1]

(Thousand barrels [2])

Country	1956	1957	1958	1959	1960 [3]
North America:					
Canada	171,981	181,848	165,496	184,778	191,842
Cuba [4]	543	395	344	192	[5] 108
Mexico	90,660	88,266	93,533	96,393	99,049
Trinidad	28,929	34,064	37,355	40,919	42,357
United States	2,617,283	2,616,901	2,449,016	2,574,590	2,574,933
Total	2,909,396	2,921,474	2,745,744	2,896,872	2,908,289

See footnotes at end of table.

TABLE 89.—World production of crude petroleum by countries [1]—Continued

(Thousand barrels [2])

Country	1956	1957	1958	1959	1960 [3]
South America:					
Argentina	31,013	33,952	35,829	44,710	64,232
Bolivia	3,196	3,575	3,435	3,170	3,574
Brazil	4,059	10,106	18,919	23,590	29,613
Chile	3,542	4,337	5,568	6,428	7,231
Colombia	44,968	46,782	46,901	53,576	55,666
Ecuador	3,420	3,191	3,108	2,759	2,730
Peru	18,383	19,222	18,732	17,733	19,255
Venezuela	899,212	1,014,457	950,796	1,011,452	1,041,708
Total	1,007,793	1,135,622	1,083,288	1,163,418	1,224,009
Europe:					
Albania	1,868	3,268	2,690	3,504	3,650
Austria	23,622	21,955	19,548	16,946	16,874
Bulgaria	1,691	2,095	1,632	1,402	1,460
Czechoslovakia	732	732	950	803	730
France	9,100	10,157	9,983	11,594	14,229
Germany, West	25,408	28,698	32,119	36,981	40,076
Hungary	9,172	5,150	6,325	7,665	8,760
Italy	4,209	8,593	10,531	11,551	13,545
Netherlands	7,652	10,623	11,306	12,367	13,378
Poland	1,363	1,341	1,298	1,277	1,460
Rumania	81,390	83,327	84,490	83,492	87,600
U.S.S.R.[6]	611,740	717,926	826,477	945,340	1,080,400
United Kingdom	489	606	591	621	649
Yugoslavia	2,076	2,797	3,267	4,188	6,671
Total [6]	780,512	897,268	1,011,207	1,137,731	1,289,482
Asia:					
Bahrein	11,015	11,691	14,823	16.473	16,500
Burma	1,837	2,958	3,454	3,967	4,078
China [5]	4,700	5,000	6,000	15,330	26,280
India	2,876	3,241	3,258	3,377	3,370
Indonesia	93,820	114,151	118,711	139,038	152,988
Iran	197,148	263,134	301,361	344,800	390,754
Iraq	232,307	163,498	266,125	311,193	353,833
Israel	146	394	642	925	930
Japan	2,169	2,243	2,563	2,852	3,678
Kuwait	399,874	416,045	509,654	504,855	594,278
Kuwait-Neutral Zone	11,684	23,259	29,469	42,438	49,829
Pakistan	2,118	2,200	2,272	2,333	2,636
Qatar	45,300	50,798	63,412	61,431	63,088
Sarawak and Brunei	42,983	41,821	39,551	40,072	34,005
Saudi Arabia	360,923	362,121	370,486	399,821	456,453
Taiwan (Formosa)	21	17	15	13	14
Turkey	2,213	2,159	2,379	2,700	2,624
Total [6]	1,411,134	1,464,730	1,734,175	1,891,618	2,155,338
Africa:					
Algeria	253	101	[7] 3,315	[7] [8] 10,625	[7] 67,408
Angola	52	71	358	361	477
Congo, Republic of (formerly French)	------	------	------	------	365
Gabon, Republic of	------	1,207	3,550	5,295	5,626
Morocco: Southern zone	734	566	560	712	695
Nigeria	------	------	1,970	4,067	6,552
United Arab Republic (Egypt region)	12,185	16,157	21,960	21,303	23,968
Total	13,224	18,102	31,713	42,363	105,091
Oceania:					
Netherlands New Guinea	2,610	2,279	1,850	1,656	1,538
New Zealand	7	6	5	5	[5] 5
Total	2,617	2,285	1,855	1,661	1,543
World total	6,124,676	6,439,481	6,607,982	[8] 7,133,663	7,683,752

[1] This table incorporates some revisions.
[2] 42 gallon barrels.
[3] Preliminary figures.
[4] Natural naphtha and gas oil.
[5] Estimate.
[6] U.S.S.R. in Asia (including Sakhalin) included with U.S.S.R. in Europe.
[7] Including Sahara.
[8] Revised figure differing from that shown in table 90.

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

TABLE 90.—World supply and demand of crude petroleum and refined products, 1959–60

(Thousands of barrels)

Country	1959								
	Crude Petroleum					Refined Products			
	Production	Imports	Exports and reexports	Stock chang other demand, and loss	Total [1] refinery input / Total [2] refinery output	Imports	Exports and reexports	Domestic demand (incl. bunkers) [3]	Bunkers all flags reported)
North America:									
Canada	184,778	115,289	33,362	+236	269,824	38,880	1,457	[4] 295,633	6,679
Mexico	96,393	73	112	−1,016	104,932	4,665	13,348	96,249	
United States (incl. Alaska)	2,574,590	352,531	2,526	+6,747	3,070,984	297,239	85,049	[4] 3,439,175	81,541
Total	2,855,761	467,893	36,000	+5,967	3,445,740	340,784	99,854	3,831,057	
Central America and Caribbean:									
Costa Rica						1,051		1,051	
Cuba	192	25,402		−470	26,064	[5] 4,398		30,462	
Dominican Republic						2,602		2,602	
El Salvador						1,472		1,472	
Guatemala						3,303		3,303	
Haiti						754		754	
Honduras						1,472		1,472	
Jamaica						5,349		5,349	1,105
Nicaragua						[5] 1,261		1,261	
Panama, Canal Zone						7,209	1,972	5,237	4,525
Panama, Republic of						2,584	5	2,579	
Puerto Rico		25,662		−520	27,331	4,578	14,631	17,278	
Total	192	51,064		−990	53,395	36,033	16,608	72,820	
South America:									
Argentina	44,710	37,957		+3,657	79,033	18,849	9	[4] 86,510	
Bolivia	3,170		948	+11	2,211	113	8	[4] 2,058	
Brazil	23,590	40,666	10,734	−2,626	56,148	28,030	299	[4] 86,130	
British Guiana						1,278	1	1,277	7
Chile	6,428	2,769		+619	8,677	[5] 7,140		[4] 16,799	
Colombia	53,576		28,522	+846	24,931	736	4,176	[4] 18,236	1,387
Ecuador	2,759	250	283	−108	2,834	935		3,769	
Netherlands Antilles		266,129		+8,526	272,010	27,327	221,655	[6] 77,682	22,035
Paraguay						727		[4] 640	

Peru	17,733	-	2,110	+112	15,664	2,556	2,797	15,423	340
Trinidad	40,919	30,798	3,253	−164	69,115	1,360	54,972	[4, 6] 16,632	13,453
Uruguay	-	8,300	-	−54	8,354	2,722	-	11,076	952
Venezuela	1,011,452	-	719,835	−5,281	298,991	[5] 570	200,602	[4] 48,602	17,821
Total	1,204,337	386,869	765,685	+5,538	837,968	92,343	484,519	384,834	
Western Europe:									
Austria	16,946	3,299	6,974	+138	13,681	6,806	1,334	[4] 17,974	
Belgium and Luxembourg	-	49,387	-	+421	49,381	19,775	18,685	[4] 47,791	1,329
Denmark	-	269	-	+47	222	34,089	110	34,201	1,881
Finland	-	7,972	-	+88	7,884	6,005	-	13,889	
France	11,594	221,647	-	+7,435	226,041	14,300	48,386	[4] 181,110	11,541
Germany, West	36,981	122,693	-	−1,008	160,682	38,453	12,549	[4] 195,109	12,830
Greece	-	10,079	-	+77	10,002	2,947	-	12,949	
Iceland	-	-	-	-	-	2,878	-	2,878	
Ireland	-	5,772	-	+606	5,166	6,090	728	[4] 8,790	
Italy	11,551	181,058	3,244	−1,777	191,929	5,645	49,295	[4] 121,635	11,802
Netherlands	12,367	91,967	-	+1,293	115,044	36,000	66,854	[4] 68,778	7,392
Norway	-	735	-	+42	693	23,435	-	[4] 23,414	2,198
Portugal	-	9,343	-	−635	9,978	2,515	2,134	[4] 8,311	738
Spain	-	30,214	-	+686	30,265	1,446	346	[4] 32,214	1,662
Sweden	-	17,255	-	−440	17,695	62,069	794	[4] 75,798	[5] 2,956
Switzerland	-	-	-	-	-	22,699	1	22,698	
United Kingdom	621	283,891	-	+629	283,883	102,537	52,492	[4] 327,003	29,918
Yugoslavia	4,188	4,548	-	+65	8,671	916	478	9,109	
Total	94,248	1,040,129	10,218	+7,667	1,131,217	388,605	254,186	1,203,651	
Middle East:									
Aden	-	30,781	-	+68	30,713	10,639	15,630	[6] 25,722	25,258
Bahrain	16,473	52,659	-	+174	69,144	449	60,351	[6] 9,242	4,511
Iran	344,800	-	212,860	−3,574	135,514	-	77,270	[4] 39,712	5,388
Iraq	311,193	-	292,354	+6,299	12,540	[5] 50	-	12,590	
Israel	925	[5] 8,555	-	-	9,480	[5] 11,090	-	20,570	[5] 372
Jordan	-	-	-	-	-	1,426	-	1,426	
Kuwait	504,855	-	452,064	+775	52,016	197	27,708	[6] 24,505	18,551
Lebanon	-	5,493	-	-	5,493	[5] 319	-	5,812	1,758
Neutral Zone	42,438	-	[5] 32,500	−992	[5] 10,930	-	[5] 7,350	3,580	[5] 1,000
Qatar	61,431	-	61,237	-	[5] 194	-	-	194	
Saudi Arabia	399,821	-	334,848	+1,363	63,610	122	43,698	[4, 6] 14,970	[5] 11,793
Turkey	2,700	-	-	+162	2,538	12,016	-	14,554	
United Arab Republic, Syria	-	[5] 1,830	-	-	[5] 1,830	3,596	-	5,426	
Total	1,684,636	99,318	1,385,863	+4,275	394,002	39,904	232,007	178,303	

See footnotes at end of table.

TABLE 90.—World supply and demand of crude petroleum and refined products, 1959–60—Continued

Country	1959								
	Crude Petroleum					Refined Products			
	Production	Imports	Exports and reexports	Stock change, other demand, and loss	Total refinery input[1] / Total refinery output[2]	Imports	Exports and reexports	Domestic demand (incl. bunkers)[3]	Bunkers all flags (as reported)
Africa:									
Algeria and French Sahara	10,205		6,455	+3,750		10,380		[4] 14,073	3,771
Angola	361	129		+7	483	939		[4] 1,377	
Belgian Congo						3,579		3,579	
Canary Islands		22,398		+1,571	23,580	1,195	15,330	9,445	5,411
Ethiopia						[5] 696		696	
States formerly in French Equatorial Africa	5,295		5,170	+125		[5] 2,182		2,182	
French West Africa						[5] 4,091		4,091	7,921
Ghana						2,834		2,834	
Kenya						5,916	134	5,782	902
Liberia						386		386	
Madagascar						986		986	
Morocco	712	687		+172	1,227	4,641		[4] 5,733	503
Nigeria	4,067		4,067			5,637		5,637	
Rhodesia and Nyasaland						[5] 3,964		[4] 4,074	
Sierra Leone						2,064	3	2,061	1,521
Sudan						3,153		3,153	
Tanganyika						2,344	437	1,907	13
Tunisia						3,241		[4] 3,399	171
Uganda						1,183	165	1,018	
Union of South Africa		9,632		+56	9,576	19,814	1,581	27,809	3,092
United Arab Republic, Egypt	21,303	11,336	7,483	+56	[5] 25,100	7,480	1,474	31,106	2,302
Total	41,943	44,182	23,175	+5,737	59,966	86,705	19,124	131,328	
South Asia, Far East, and Oceania:									
Australia		73,545		−460	75,733	11,994	7,352	[4] 78,477	7,034
British Borneo	40,072		24,696		[5] 15,376	844	14,937	1,283	1,066
Burma	3,967			+444	3,523	[5] 594		4,117	[5] 200
Ceylon						7,191	4	7,187	2,982
India	3,377	36,037		+2,338	[5] 37,076	13,482	2,067	48,491	[5] 2,880

Indonesia	139,038	[5]11,435	61,661	+6,014	[5]88,019	1,908	41,908	[4]31,607	5,540
Japan	2,852	139,080	----	−1,236	143,168	23,061	2,681	163,548	16,244
Korea, South	----	----	----	----	----	[5]10,953	----	10,953	
Malaya and Singapore	----	2,139	1,910	+229	----	41,601	17,474	24,127	12,283
Netherlands New Guinea	1,656	----	[5]1,656	----	----	----	----	(7)	
New Caledonia	----	----	----	----	----	377	----	377	
New Zealand	----	----	----	----	----	12,462	----	12,462	1,557
Pakistan	2,333	----	----	+51	2,282	[5]7,924	175	[4]14,827	
Philippines	----	8,662	----	−280	8,942	10,305	----	19,247	132
Taiwan	13	7,235	----	+785	6,463	4,634	58	11,039	
Thailand	----	----	----	----	----	8,242	232	8,010	402
Vietnam, South (incl. Cambodia)	----	----	----	----	----	5,534	----	5,534	35
Total	193,308	278,133	89,923	+7,885	380,582	161,106	86,888	441,286	
Total excluding Eastern Europe, U.S.S.R., and Mainland China	6,074,425	2,367,588	2,310,864	+36,079	6,302,870	1,145,480	1,193,186	6,243,279	
Total Sino-Soviet bloc [5]	1,058,813	7,388	47,698	−1,358	1,019,861	37	69,350	950,548	
Total World	7,133,238	2,374,976	2,358,562	+34,721	7,322,731	1,145,517	1,262,536	7,193,827	

See footnotes at end of table.

TABLE 90.—World supply and demand of crude petroleum and refined products, 1959–60—Continued

Country	1960 [8]								
	Crude Petroleum					Refined Products			
	Production	Imports	Exports and reexports	Stock change, other demand, and loss	Total [1] refinery input / Total [2] refinery output	Imports	Exports and reexports	Domestic demand (incl. bunkers) [3]	Bunkers all flags (as reported)
North America:									
Canada	191,842	125,560	42,235	−2,207	280,559	35,298	2,295	[4] 306,614	[5] 6,570
Mexico	99,049	--------	1,103	−1,950	107,278	7,895	6,447	108,726	
United States (incl. Alaska and Hawaii)	2,574,933	371,575	3,091	−9,117	3,119,327	294,098	70,798	[4] 3,541,758	78,859
Total	2,865,824	497,135	46,429	−13,274	3,507,164	337,291	79,540	3,957,098	
Central America and Caribbean:									
Costa Rica	--------	--------	--------	--------	--------	[5] 1,034	--------	1,034	
Cuba	[5] 108	[5] 22,552	--------	−374	[5] 23,034	[5] 4,548	--------	27,582	
Dominican Republic	--------	--------	--------	--------	--------	[5] 2,835	--------	2,835	
El Salvador	--------	--------	--------	--------	--------	[5] 1,588	--------	1,588	
Guatemala	--------	--------	--------	--------	--------	[5] 2,921	--------	2,921	
Haiti	--------	--------	--------	--------	--------	[5] 620	--------	620	
Honduras	--------	--------	--------	--------	--------	1,495	--------	1,495	
Jamaica	--------	--------	--------	--------	--------	5,423	--------	5,423	1,203
Nicaragua	--------	--------	--------	--------	--------	[5] 1,418	--------	1,418	
Panama, Canal Zone	--------	--------	--------	--------	--------	8,045	1,994	6,051	5,448
Panama, Republic of	--------	--------	--------	--------	--------	[5] 2,774	--------	2,774	
Puerto Rico	--------	26,469	--------	+158	29,140	5,665	13,485	21,320	
Total	108	49,021	--------	−216	52,174	38,366	15,479	75,061	
South America:									
Argentina	64,232	22,982	--------	+1,511	85,703	13,835	11	[4] 89,007	1,445
Bolivia	3,574	--------	1,088	+225	2,261	122	44	[4] 2,219	
Brazil	29,613	40,139	4,297	−1,028	66,483	[5] 30,084	--------	96,567	
British Guiana	--------	--------	--------	--------	--------	1,672	--------	1,672	
Chile	7,231	3,584	--------	−49	10,864	[5] 5,437	--------	[4] 17,540	
Colombia	55,666	--------	31,661	−845	26,562	1,030	4,096	[4] 20,153	1,200
Ecuador	2,730	1,459	--------	−55	4,244	248	--------	4,492	
Netherlands Antilles	--------	261,023	1,783	−368	279,253	17,360	234,905	[6] 61,708	22,088
Paraguay	--------	--------	--------	--------	--------	811	--------	[4] 673	

Peru	19,255	-----	2,591	+122	16,748	4,076	3,055	17,769	262
Trinidad	42,357	40,218	5,071	−4,396	82,341	1,565	63,190	[6] 17,373	13,823
Uruguay	-----	9,267	-----	−222	9,489	1,782	-----	11,271	1,825
Venezuela	1,041,708	-----	730,962	−12,180	330.105	543	251,782	[4] 56,593	17,165
Total	1,266,366	378,672	777,453	−17,285	914,053	78,565	557,083	397,037	
Western Europe:									
Austria	16,874	3,852	6,908	+178	14,171	8,676	1,095	[4] 20,890	
Belgium and Luxembourg	-----	50,493	-----	−1,183	52,217	24,507	19,687	[4] 50,235	4,319
Denmark	-----	38	-----	−158	[5] 196	38,669	127	38,738	1,701
Finland	-----	8,391	-----	+641	[5] 7,750	11,715	3	19,462	
France	14,229	230,416	6	−127	244,973	16,663	52,819	[4] 204,143	11,725
Germany, West	40,076	169,702	-----	+5,168	204,610	27,044	20,238	[4] 229,061	15,929
Greece	-----	12,752	-----	−52	12,804	4,567	-----	17,371	
Iceland	-----	-----	-----	-----	-----	2,795	-----	2,795	
Ireland	-----	10,671	-----	−228	10,899	3,388	809	13,478	
Italy	13,545	216,977	3,529	+1,119	236,513	12,551	50,284	[4] 164,564	17,310
Netherlands	13,378	120,658	60	−3,543	149,653	37,214	85,186	101,681	9,700
Norway	-----	1,513	-----	+632	[5] 881	25,940	-----	26,821	
Portugal	-----	9,654	−559	-----	10,213	4,333	1,851	12,695	2,998
Spain	-----	29,984	-----	+78	30,705	2,468	1,415	[4] 33,971	[5] 2,043
Sweden	-----	19,176	-----	−1,034	20,210	77,679	967	96,922	[5] 2,956
Switzerland	-----	-----	-----	-----	-----	28,439	32	28,407	
United Kingdom	649	320,774	-----	+149	321,274	112,921	68,453	[4] 344,238	28,119
Yugoslavia	6,671	[5] 3,970	-----	+1,138	9,503	[5] 1,620	[5] 695	10,428	
Total	105,422	1,209,021	9,944	+2,778	1,326,572	441,189	303,661	1,415,900	
Middle East:									
Aden	-----	31,332	-----	+308	31,024	12,385	16,955	[6] 26,454	26,436
Bahrain	16,500	59,599	-----	+169	76,131	505	66,238	[6] 10,398	4,410
Iran	390,754	-----	246,286	+2,379	[5] 142,089	-----	93,401	[4] 45,960	[5] 6,216
Iraq	353,833	-----	[5] 337,705	+930	[5] 15,198	[5] 13	-----	15,211	
Israel	930	[5] 9,795	-----	-----	10,725	[5] 10,776	121	21,380	[5] 360
Jordan	-----	[5] 132	-----	-----	[5] 132	[5] 1,277	-----	1,409	
Kuwait	594,278	-----	527,299	+2,036	64,943	10	32,308	[6] 32,645	22,719
Lebanon	-----	5,422	-----	-----	5,422	[5] 361	-----	[4] 6,488	1,868
Neutral Zone	49,829	-----	[5] 39,241	−1,262	[5] 11,850	[5] 33	[5] 6,100	5,783	[5] 2,900
Qatar	63,088	-----	62,424	+448	[5] 216	-----	-----	[4] 367	
Saudi Arabia	456,453	-----	372,929	+1,212	82,312	86	57,593	[4, 6] 24,900	12,720
Turkey	2,624	-----	-----	+198	[5] 2,426	9,652	-----	12,078	
U.A.R., Syria	-----	5,176	-----	+95	5,081	1,297	-----	6,378	
Total	1,928,289	111,456	1,585,884	6,513	447,549	36,395	272,716	209,411	

See footnotes at end of table.

TABLE 90.—World supply and demand of crude petroleum and refined products, 1959–60—Continued

Country	1960 [6]								
	Crude Petroleum					Refined Products			
	Production	Imports	Exports and reexports	Stock change, other demand, and loss	Total [1] refinery input / Total [2] refinery output	Imports	Exports and reexports	Domestic demand (incl bunkers) [3]	Bunkers all flags (as reported)
Africa:									
Algeria and French Sahara	67,408		63,438	+3,970		10,518		10,518	[5] 3,771
Angola	477	868		+33	1,312	761	306	1,767	
Republic of the Congo						[5] 3,318		3,318	
Canary Islands		21,577		+13	28,950	1,076	16,446	13,580	5,183
Ethiopia						[4] 935		935	
States formerly in French Equatorial Africa	5,991		5,843	+148		[5] 2,136		2,136	
States formerly in French West Africa						[5] 4,091		4,091	[5] 7,920
Ghana						[5] 3,562		3,562	
Kenya						[5] 6,156	[5] 995	5,161	[5] 907
Liberia						[5] 386		386	[5] 40
Malagasy Republic						960		960	
Morocco	695	992		+54	1,633	4,680		[4] 6,675	[5] 530
Nigeria	6,552		6,226	+326		5,813		5,813	
Federation of Rhodesia and Nyasaland						[5] 4,118		4,118	
Sierra Leone						2,268		2,268	[5] 1,521
The Sudan						3,320		3,320	
Tanganyika						2,435	398	2,037	
Tunisia						3,724		[4] 3,565	
Uganda						1,201	204	997	
Union of South Africa		9,716		+507	9,209	19,922	2,289	26,842	[5] 3,720
United Arabic Republic, Egypt	23,968	15,382	[5] 4,124	+3,891	31,335	7,892	1,245	37,982	178
Total	105,091	48,535	79,631	8,942	72,439	89,272	21,883	140,031	
South Asia, Far East, and Oceania:									
Australia		85,131		+1,159	86,630	11,610	12,815	[4] 80,632	9,422
British Borneo	34,005		18,882		[5] 15,123	[5] 951	[5] 14,889	1,185	[5] 1,000
Burma	4,078			+199	3,879	205	71	4,013	
Ceylon						4,575	6	4,569	3,203
India	3,370	[5] 43,160		+1,740	[5] 44,790	[5] 17,017	[5] 1,983	59,824	[5] 3,400

Indonesia	152,988	9,556	80,528	+2,365	[5] 86,756	[5] 3,852	[5] 38,654	[4] 35,274	
Japan	3,678	195,748	--------	−2,794	207,883	38,323	3,846	242,360	26,771
Korea, South	--------	--------	--------	--------	--------	4,969	--------	4,969	
Malaya and Singapore	--------	[5] 2,310	[5] 1,927	+383	--------	[5] 44,773	[5] 18,863	25,910	[5] 13,170
Netherlands New Guinea	1,538	--------	1,538	--------	--------	(7)	--------	(7)	
New Caledonia	--------	--------	--------	--------	--------	[5] 408	--------	408	
New Zealand	--------	--------	--------	--------	--------	13,346	--------	13,346	[5] 1,557
Pakistan	2,636	--------	--------	+252	2,384	[5] 11,456	[5] 252	13,588	
Philippines	--------	10,474	--------	+383	10,091	10,049	--------	20,140	167
Taiwan	14	7,949	--------	+276	7,687	139	104	7,722	
Thailand	--------	--------	--------	--------	--------	8,490	--------	8,490	418
Vietnam, South (incl. Cambodia)	--------	--------	--------	--------	--------	6,123	--------	6,123	74
Total	202,307	354,328	102,875	+3,963	465,223	176,286	91,483	528,553	
Total excluding Eastern Europe, U.S.S.R., and Mainland China	6,473,407	2,648,168	2,602,216	−8,579	6,785,174	1,197,364	1,341,845	6,723,091	
Total Soviet-Sino bloc [8]	1,210,340	7,300	60,590	+14,951	1,142,099	44	90,520	1,051,623	
Total World	7,683,747	2,655,468	2,662,806	+6,372	7,927,273	1,197,408	1,432,365	7,774,714	

[1] Total input includes crude runs to stills plus runs of other unfinished oils, topped crude and natural gas liquids blended.

[2] Total output includes refined product output plus refinery fuel and loss; excludes liquefied petroleum gases sold directly for fuel and chemical uses from natural gasoline plants.

[3] Unless otherwise specified, data represent apparent domestic demand (including inland demand, refinery fuel and loss, and bunkers). Apparent domestic demand is derived from the components of refined product output, plus imports, minus exports, with no allowance for changes in stocks.

[4] Domestic demand as reported, including refinery fuel and loss, stock changes, and bunkers; also includes, where available, liquefied petroleum gases sold directly for fuel and chemical uses from natural gasoline plants.

[5] Estimate based on latest available data.

[6] Apparent domestic demand is heavily influenced by refinery fuel and loss, and bunker loadings.

[7] Insignificant.

[8] Preliminary.

NATIVE ASPHALT

Bituminous Limestone and Sandstone.—Production of bituminous limestone declined 273.6 thousand short tons in 1960 to 1,235.7 tons, and the average value per ton declined 8 cents from a year ago ($2.44 in 1960 compared with $2.52 in 1959). Bituminous limestone was produced in Alabama, Oklahoma, and Texas.

Bituminous sandstone was produced only in Missouri, and total production for 1960 was 7.2 thousand short tons; value averaged $8.45 per ton.

Gilsonite.—All gilsonite production was in Utah and the major part of this production was transported by pipeline to a refinery in Colorado where it was converted into petroleum products. Production in 1960 totaled 383 thousand tons.

TABLE 91.—Production and value of bituminous limestone, bituminous sandstone. and gilsonite, in the United States

Year	Bituminous limestone		Bituminous sandstone		Gilsonite	
	Production (short tons)	Value (thousands)	Production (short tons)	Value (thousands)	Production (short tons)	Value (thousands)
1950	1,184,676	$3,522	(1)	(1)	66,186	$1,774
1951	1,378,434	4,159	(1)	(1)	65,521	1,895
1952	1,428,562	3,560	142,136	$1,127	60,740	1,780
1953	1,327,224	3,408	113,320	942	60,505	2,184
1954	1,191,793	2,782	146,029	905	75,943	2,724
1955	1,330,311	3,274	96,896	837	82,822	3,117
1956	1,358,669	3,223	99,864	891	89,003	3,822
1957	1,134,781	2,996	33,726	225	207,704	4,259
1958	1,305,555	3,218	20,938	125	317,280	4,864
1959	1,509,277	3,810	9,488	58	379,362	9,385
1960	1,235,658	3,009	7,216	61	383,037	10,020

[1] Included with bituminous limestone.

Helium

By Harold W. Lipper [1]

CONTENTS

SUMMARY

NEW RECORDS were established for helium production and shipment in 1960. Production of this irreplaceable element was 642 million cubic feet; 475 million cubic feet were shipped. The increase in helium demand, about 27 percent, continued to follow the pattern set during the past ten years. However, production was in excess of demand and permitted the addition of 165 million cubic feet to the volume stored underground for future use. The total volume of helium in underground storage at the end of 1960 was 273 million cubic feet.

Modification and modernization of the Exell, Tex., plant increased its capacity about 35 percent, which permitted recovery of helium from almost all of the helium-bearing natural gas produced by the gas supplier in meeting his fuel market commitments.

Legislation amending the Helium Act of 1925 (43 Stat. 1110; 50 U.S.C. 161, 163–166) was approved September 13, 1960, to become effective March 1, 1961. The new legislation makes possible a long-range program to save for future use over a 25-year period about 52 billion cubic feet of helium that would ordinarily be wasted when helium-bearing natural gas is used for fuel.

Additional unpublished results of research relating to extraction of helium from natural gas were made available to those with potential interest in participating in the helium conservation program.

PRODUCTION

Helium production in 1960 was 642,033,000 cubic feet, an increase of 34 percent over the previous record set in 1959. The Bureau of Mines helium plants at Amarillo and Exell, Tex., Keyes, Okla., Otis, Kans., and Shiprock (Navajo), N. Mex., were operated throughout the year. At Exell, the original portion of the plant, which was con-

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structed in 1942–43, was shut down about four months for modification and modernization. Changes consisted primarily of replacing obsolete low-temperature natural gas processing equipment with improved equipment, designed by the technical staff of the Bureau of Mines Helium Activity, and modification of natural gas compressors (including replacement of piping) to accommodate different operating pressures. The changes resulted in more efficient use of existing compressors, and reduced overall power requirements for helium recovery. These changes increased the plant capacity about 35 percent. The increase in daily helium-bearing natural gas processing capacity from 100 to 135 million cubic feet will permit the recovery of helium from almost all the gas produced by the gas supplier. The cost of modifying the plant was $1,327,000.

About 80 percent of the total production was from the two largest plants, Exell and Keyes. Helium production from the Navajo and Otis plants was about one-half capacity because of limited helium-bearing natural gas supplies. Operations at the Amarillo, Tex., plant were at almost full capacity to meet the demand for helium in small cylinders and semitrailers.

Total production exceeded demand for the second successive year. The excess, about 165 million cubic feet, was stored underground in the Government-owned Cliffside field, and brings the total volume in underground storage to 273 million cubic feet. The stored helium would require processing and purification before shipment, but it is a supply that has not been previously available.

TABLE 1.—Helium production in the United States, 1921–60

(Thousand cubic feet)

Year	Production	Year	Production
1921-28	[1] 5,761	1956	243,880
1929-42	[1] 11,776	1957	291,457
1943-49	[1] 83,545	1958	334,175
1950-54	[1] 137,957	1959	476,892
1955	220,711	1960	642,033
		Cumulative production, 1921-60	3,694,709

[1] Annual average.

SHIPMENTS

Helium shipments were 475,179,000 cubic feet, about 27 percent more than the peak set in 1959. Shipments to Federal agencies were 360,063,000 cubic feet, and those to non-Federal consumers were 115,116,000 cubic feet.

The five plants handled shipment of 1,597 tank cars, 417 semitrailers, and 199,836 standard cylinders.

Delivery of 25 new tank cars increased the total in the tank-car pool to 188. Ownership of cars in the pool is divided between the Bureau of Mines (163 cars) and the Atomic Energy Commission (25 cars). Cars regardless of ownership, are used interchangeably for shipping helium to provide efficient fleet utilization.

Tank cars are filled at all plants except Amarillo. The Amarillo plant fills only small cylinders and semitrailers and is the headquarters for small cylinder operations. None of the other plants are equipped to fill small cylinders. The Exell, Keyes, and Navajo plants (Gallup, N. Mex., Rail Terminal) are equipped to accommodate container-filling pressures up to 4,000 pounds per square inch.

CONSUMPTION AND USES

Federal agencies received about 76 percent of the helium shipments in 1960. Most of the remainder was used by defense contractors. The increase in helium demand continued the pattern set during the past ten years at about 20 percent a year.

Defense and space agencies and the Atomic Energy Commission continued to use an increasing amount of helium in their operations and research. Helium is useful in many fields because of its unique properties. Some of these are: Inertness, low density, high thermal and electrical conductivity, low refractive index, slow ionization, rapid diffusion, and the lowest temperature of liquefaction of any gas. Its boiling point at atmospheric pressure is only 4.2 degrees above absolute zero (−459.72° F.). Temperatures lower than 20 degrees above absolute zero cannot be attained without it.

In fact, the extreme cold obtainable with liquid and solid helium has opened a broadening field of research at temperatures near absolute zero. Molecular fragments normally having a life of a few thousandths of a second in chemical reactions can be trapped by freezing them in liquid helium to extend their life indefinitely. These frozen-free radicals can be studied with ease. It may be possible to release their energy in a controlled manner to provide power, and their high energy level and low mass may prove advantageous in space flight.

Some metals at the temperature of liquid helium become superconductors; they exhibit little or no resistance to the flow of electricity. This phenomenon has led to the development of the cryotron, which when surrounded by liquid helium, will perform the function of transistors or vacuum tubes, thus enabling development of extremely small, highly reliable computers.

MASER (microwave amplification by stimulated emission of radiation) and other low-temperature amplifying devices provide gains of about 1,000 or 30 decibels in signal-to-noise ratio over conventional amplifiers. These devices make it possible to construct extremely sensitive receivers for use in ultrahigh-frequency communication on the earth and in space, and to greatly increase the sensitivity of radar and radio telescopes.

Helium is also used in shielded-arc welding and leak detection, atomic-energy and guided-missile operations, and the inflation of airships and meteorological balloons.

RESOURCES

Helium resources in the United States are estimated to be about 154 billion cubic feet. Over 95 percent of the resources are contained in four helium-bearing gas-fields: (1) The Hugoton field of Kansas, Oklahoma, and Texas; (2) the Panhandle field of Texas; (3) the Greenwood field of Kansas; and (4) the Keyes field of Oklahoma. These natural gas deposits have been developed by private companies to supply gas for fuel markets and are being operated for that purpose.

Resources available to the five Bureau of Mines helium plants are about 10 percent of the known sources of helium. The two largest plants of the Bureau of Mines, Exell, Tex., and Keyes, Okla., extract helium from gas produced within the area where the major helium resources are found. Each of the two plants is capable of extracting helium at the maximum natural gas withdrawal rate planned by the respective gas suppliers to supply established fuel markets. Plants at Shiprock, N. Mex., and Otis, Kans., extract helium from gas produced in small, isolated fields outside the area. The only developed source of helium-bearing natural gas owned by the Government is the Cliffside field in the Texas Panhandle not far from Amarillo. Helium is extracted from this field by the Bureau of Mines Amarillo plant. Resources of the Cliffside field are about 2 billion cubic feet of helium—important but small compared with the resources of major helium-bearing natural gasfields, which produce gas for fuel and from which helium is not extracted. Annual loss of helium from such fields is more than 4 billion cubic feet.

Discoveries of helium-bearing gas deposits in Utah and Colorado offer prospects of additional helium resources. Development of the area by private companies for oil and fuel gas production continues to reveal gas deposits containing helium. However, extent of the new fields has not been defined fully, and fuel gas production is small.

Two minor helium-bearing natural gasfields have been discovered on lands of the public domain. These lands were withdrawn and established as Helium Reserve No. 1, Woodside structure, Utah, and Helium Reserve No. 2, Harley Dome, Utah, in March 1924 and June 1933, respectively. Neither field has been used.

A possible new source of helium for commercial purposes is the Pinta field in Apache County, Ariz., where the gas contains about 8 percent helium. The gas is not marketable as fuel, and the field has been shut in. Near the end of the year, a private company having several wells in the field announced plans for construction of a helium extraction plant as a private venture.

Other known sources of helium are primarily of academic interest. Helium is found in gases from mineral springs, fumaroles, and volcanoes, it is in the air (1 part in 200,000), and can be formed by nuclear bombardment and fusion. However, none of these sources is economical for commercial production.

CONSERVATION

The Nation's helium resources appear to be adequate to meet predicted demands only if the large volume now wasted is saved for future use. The resources are diminishing at a rapid rate because helium-bearing natural gas is used for fuel. Unless helium is recovered before natural gas is used as fuel, the helium is lost to the atmosphere without serving any useful purpose. However, helium demand continues to grow rapidly, and it is likely that resources remaining after 1985 could not fill probable needs beyond that time.

Important steps were taken during 1960 to assure a continuing helium supply. A program for the conservation of helium was made possible when Congress passed new legislation amending the Helium Act of 1925, as amended (43 Stat. 1110; 50 U.S.C. 161, 163–166). The new legislation (Public Law 86–777), was approved September 13, 1960, to become effective March 1, 1961 and includes, for the first time, authority to enter into long-term contracts for the purchase of helium. Under the program being developed, private industry has been encouraged to participate by financing, building, and operating as many as 12 new plants. The plants would extract helium from natural gas before transmission of the gas to fuel markets. Helium thus recovered would be purchased by the Government under long-term contracts and stored underground in the Government-owned Cliffside field near Amarillo, Tex., for later withdrawal and purification to meet future needs. The program contemplates the purchase of as much as 88 billion cubic feet of helium over a 25-year period. Helium demand for the period is predicted to be 36 billion cubic feet, so 52 billion cubic feet could be stored for future use. A program of this magnitude offers good prospects of assuring a continued helium supply beyond the year 2000.

In October, guidelines for submitting proposals for participation in the helium conservation program were sent to about 250 firms or individuals that had expressed interest in the program. Shortly after the end of the year, proposals had been received from 14 firms covering a total of 23 plant sites. All sites previously considered by the Bureau of Mines in developing the program were represented in the proposals. Funds were not available during 1960. Timing and scope of the program will depend on congressional appropriations.

PRICES

The Helium Act of 1925, as amended (43 Stat. 1110; 50 U.S.C. 161, 163–166), provides that Federal agencies may requisition helium from the Bureau of Mines by paying proportionate shares of the expenses of administration, operation, and maintenance of the Government helium plants and properties. Throughout 1960, the price to Federal agencies was $15.50 a thousand cubic feet.

The price of helium sold by the Bureau of Mines to commercial customers was $19 a thousand cubic feet. An additional charge of $2 a thousand cubic feet covered filling costs, when helium was required in standard-type cylinders. A list of charges and other information on the sale of helium by the Bureau of Mines is included in the "Code of Federal Regulations" (30 C.F.R. 1).

FOREIGN TRADE

Small quantities of helium are exported annually under licenses approved by the Secretary of State. An important use for helium abroad is in fundamental research at temperatures near absolute zero.

TECHNOLOGY

Research was conducted at the Bureau of Mines Amarillo Helium Activity to improve efficiency and reduce costs of producing and transporting helium. Part of the research in 1960 was on phase relationships of helium-bearing natural gases. Results of this research and other data relating to extraction of helium from natural gas by low-temperature processes were added to information previously placed on open file to provide information of interest to private industry in connection with their possible participation in the helium conservation program. The reports placed on open file were "Information on the Cost and Operation of the Bureau of Mines Excell and Keyes Helium Plants," "A Study of a 0.4 Percent Helium-Bearing Natural Gas," and "Phase Equilibrium Data for Eight Helium-Bearing Natural Gas Systems."

Results of Bureau of Mines research on compressibility of helium were published.[1] Results of research on analyzing helium for trace impurities were described.[2]

A continuous survey was conducted to determine potential new sources of helium-bearing natural gas from various places throughout the United States and, to a limited extent, from other countries. Analysis of the gas and the heating value calculated from the analysis (16 components in all) are furnished to the gas-well or pipeline owner in return for supplying the sample. In 1960, 474 samples were analyzed without discovering new deposit of helium-bearing natural gas comparable with known deposits.

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[1] Stroud, L., Miller, J. E. ,and Brandt, L. W. Compressibility of Helium at −10° to 130° F. and Pressures to 4,000 p.s.i.a: Jour. Chem. and Eng. Data, vol. 5, no. 1, January 1960, pp. 51-52. Miller, J. E., Stroud, L., and Brandt, L. W. Compressibility of Helium-Nitrogen Mixtures: Jour. Chem. and Eng. Data, vol. 5, no. 1, January 1960, pp. 6–9.

[2] Kirkland, C. G., Brandt, L. W., and Deaton, W. M. Determining Trace Impurities in Grade-A Helium: Bureau of Mines Rept. of Investigations 5644, 1960.

PART III. APPENDIX

Table of Measurement

Volumetric measures

	U.S. gallons	Imperial gallons	Cubic feet	Barrels	Cubic centimeters	Liters	Cubic meter
1 U.S. gallon [1]	1	0.83268	0.13368	0.02381	3,785.4	3.7853	0.0037854
1 imperial gallon [2]	1.201	1	.16054	.028594	4.546.04	4.5460	.004546
1 cubic foot	7.4805	6.22888	1	.17811	28.317.01	28.316	.028317
1 barrel [3]	42	34.972	5.6146	1	158,987.55	158.98	.15899
1 cubic centimeter	.00026417	.00021996	.000035314	.0000062895	1	.00099997	.000001
1 liter	.26418	.219976	.035316	.0062899	1,000.027	1	.001000027
1 cubic meter	264.17	219.97	35.314	6.2898	1,000,000	999.97	1

[1] U.S. gallon—the volume occupied by 231 cubic inches.
[2] 1 imperial gallon—the volume occupied by 10 pounds of water at 62° F. when weighed against brass in air at 30″ barometric pressure.
[3] 1 barrel—42 U.S. gallons.

Weight measures

	Pounds	Kilograms	Short or net tons	Metric tons	Long ton
1 pound	1	0.45359	0.0005	0.00045359	0.00044643
1 short or net hundredweight	100.0	45.359	.05	.04536	.04464
1 gross or long hundredweight	112.0	50.802	.056	.05080	.05
1 kilogram	2.2046	1	.0011023	.001	.0009842
1 short or net ton	2,000	907.185	1	.90718	.89286
1 metric ton	2,204.6	1,000	1.1023	1	.98421
1 long ton	2,240	1,016.06	1.12	1.01606	1

Note.—1 English water ton—the volume occupied by 1 long ton of water at 60° F.

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