Geol Survey

STATE OF ILLINOIS
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MINERAL PRODUCTION IN ILLINOIS IN 1959

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CIRCULAR 300 1960

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ABSTRACT

The amount and value of minerals produced in Illinois during 1959 and 1958 are summarized in tables, maps, and charts in this annual report. It is estimated that the total value of minerals produced in 1959 amounted to 603 million dollars. Revised values for 1958 totaled 611.6 million dollars. The minerals include coal, crude oil and associated products, stone, sands and gravel, fluorspar, metals, and such related items as clay products, cement, and lime.

INTRODUCTION

Viewed in the light of the affairs of men, a century seems an impressive period of time, but in the perspective of history the mineral industries of Illinois were just awakening one hundred years ago. In 1860 Illinois was a relatively young state, having gained statehood only 42 years previously, in the year 1818.

From the time of the early exploration of the territory to the period of settlement, only easily accessible deposits or outcrops of a few minerals gained men's attention so there was not much actual development of the mineral wealth of the state.

As Illinois was settled, the population spread up the main river valleys, attracted by the abundance of game, water, and wood. Thus settlers were early led into the very parts of the state where natural conditions made most easily available such important mineral resources as stone, coal, lead, and clay. On the west side of the state the Mississippi River and its larger tributaries have cut through the glacial drift in many places, exposing stone, coal, and clay resources. To some extent this was true also along the Wabash River. The unglaciated northwest corner and southern end of the state also were areas where the mineral resources were more likely to be exposed than in the central part of the area where the cover of glacial drift is thick and relatively unbroken in most places.

Natural though it was that large development of mineral wealth should not accompany early settlement, there were a few other reasons for the slowness with which Illinois responded to the opportunities that lay hidden beneath and within her soils and rocks. Possibly the glamour of finding gold or silver occupied the explorer's mind, and he may have been unwilling to stay long in a region where the minerals were less alluring. Also, the very presence of the forests, which attracted the early settlers because they supplied men's immediate needs, somewhat hindered the early development of mineral resources because they slowed up the thorough exploration for mineral deposits. Thus the vast resources of the heart of the state remained concealed from view except where the rivers had exposed them.

Table 1. - Summary of Illinois Mineral Production, 1958-1959[a]

Material	Unit	1958*,[c] Quantity	1958*,[c] Value at plants Total	1958*,[c] Value at plants Av.	1959[b,c] Quantity	1959[b,c] Value at plants Total	1959[b,c] Value at plants Av.
Coal - bituminous	tons	43,777,130	$ 175,984,063	$ 4.02	45,374,626	$ 183,313,489	$ 4.04
Crude oil	bbls.	80,779,000	242,337,000	3.00	76,727,000	230,181,000	3.00
Limestone and dolomite	tons	33,064,789	43,876,091	1.33	29,500,000	39,365,000	1.33
Cement	bbls.	9,618,339	30,858,270	3.21	9,925,000	31,791,000	3.20
Clay products	-	-	55,276,000	-	-	58,285,943	-
Sand	tons	11,461,532	10,360,460	.90	10,700,000	9,775,000	.91
Gravel	tons	16,578,457	15,696,087	.95	14,775,000	14,075,000	.95
Special sands	-	-	9,420,987	-	-	9,987,000	-
Fluorspar	tons	152,087	7,930,613	52.15	110,000	5,750,000	52.28
Zinc	tons	24,940	5,087,760	204.00	25,275	5,762,700	228.00
Lead	tons	1,610	376,740	234.00	2,125	505,750	238.00
Other minerals[d]	-	-	14,420,929	-	-	14,208,118	-
Annual mineral production			$ 611,625,000			$ 603,000,000	

* Revised figures.
a Compiled from figures by the U. S. Bureau of Mines, the Illinois State Department of Mines and Minerals, and the Illinois State Geological Survey.
b Preliminary or estimated figures.
c Subject to revision.
d Includes natural gas, natural gasoline, liquefied petroleum gases, and lime.

Development of mineral resources of the central drift-covered part of Illinois had to wait until the population spread out of the forested stream valleys onto the treeless prairies.

The first-comers to Illinois, although curious about the prairies, generally avoided them for several reasons: the prairies were ill-drained, and the absence of trees was thought to mean that they were infertile; they provided no timber needed for buildings, fences, and fuel; they did not furnish running water for stock or mills; they offered no protection from bitter winter winds for either men or livestock; and to the farmer the prairies with their tough sod was a new and unknown problem.

If the farmers had only known that within and beneath the prairie mask was stored not only fuel and water in abundance but that the drift itself was one of the richest sources of plant food in the world, the prairies need not have waited for half a century for their share of population.

Another highly significant problem intimately related to the development of the state's mineral resources was that of transportation. Most of Illinois' mineral products are relatively bulky, and therefore the transportation problem had to be solved before it was economically possible to produce mineral commodities for use distant from their source, unless they could be shipped by barge on the waterways.

The first railroad in Illinois was built in 1837, but it was only about six miles long, constructed on the east side of the Mississippi River opposite St. Louis, to haul coal from the bluff to the river. In spite of the early beginning, the railroad period in Illinois is not considered to have begun until about 1850, the year when railroad mileage began to increase rapidly. Perhaps an even later date might well be established because it was not until after 1850 that locomotives first began to use coal instead of wood as fuel. In fact, until 1854 coal was hauled by wood-burning locomotives, and the greatest impetus given to the expansion of the coal industry after the construction of the railroads was the purchase by the Galena and Chicago Union Railroad in that year of five locomotives guaranteed to burn bituminous coal mined in Illinois.

The brief historical notes above indicate that the mineral industries in Illinois were slow to develop for reasons related to the problems of settlement. However, the times just prior to the 1860's saw a depression sweep the nation, and the friction between North and South had taken a turn for the worse just before the Civil War. Consequently, it was not until 1870 that the period of real growth came to the Illinois mineral industries, although firm foundations had been laid prior to 1870 for industries of prime importance — coal, stone, clay products, and cement.

Interesting as it is to review the early problems and triumphs related to the founding of the Illinois mineral industry, today's substantial mineral production is based upon the work and intelligence of many generations of men and upon the rich storehouse of useful minerals with which nature endowed the state of Illinois.

ILLINOIS MINERAL INDUSTRY

This report records the extent and volume of the Illinois mineral industry which, although not as obvious as the state's well known manufacturing industry or rich agriculture, has grown in annual value from less than 100 million dollars to more than 600 million dollars over the last 25 years.

Of all the minerals produced in this state, none is more important for manufacturing, transportation, and for the production of food than the basic fuels — coal and oil. These minerals account for about 69 percent of the value of Illinois mineral output, according to preliminary 1959 figures.

Abundant industrial minerals such as sand, gravel, stone, cement- and lime-making materials furnish supplies for the construction industries and account for about 19 percent of the value of Illinois mineral production.

Accounting for the remaining 12 percent of the total value of Illinois mineral products are several other minerals. Refractory clays and clays for making pottery are produced in important quantities. Illinois is also the nation's leading producer of fluorspar, a mineral important in the steel, chemical, aluminum, and ceramics industries. Also produced in Illinois are the metals zinc and lead, and occasional small quantities of silver.

Table 1 gives a complete summary of the Illinois mineral industry for 1958 and 1959 (fig. 1), listing the various minerals produced, their amounts, and total values. The value of these minerals has exceeded the half-billion dollar mark in 1948 and each year since 1950.

Table 2 shows the complete record of the total value of minerals produced in

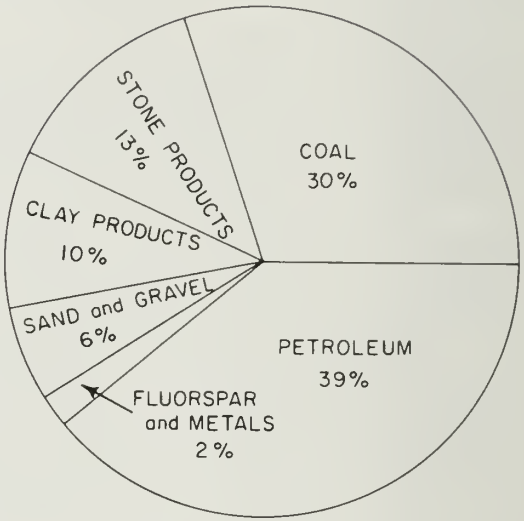

Fig. 1 - Estimated value of Illinois mineral production in 1959 was 603 million dollars. Percentage contributions by the various segments of the Illinois mineral industry are shown above.

Table 2. - Value of Illinois Mineral Production, 1915-1959[a]
(thousands of dollars)

Year	Mineral production	Year	Mineral production	Year	Mineral production
1915	$114,446	1930	$148,311	1945	$344,267
1916	146,360	1931	108,066	1946	379,673
1917	234,736	1932	71,693	1947	458,734
1918	271,244	1933	74,837	1948	567,624
1919	213,701	1934	89,212	1949	487,808
1920	373,926	1935	96,484	1950	539,236
1921	254,019	1936	117,916	1951	542,031
1922	244,618	1937	133,437	1952	500,820
1923	282,761	1938	130,155	1953	501,926
1924	235,796	1939	215,157	1954	519,242
1925	231,658	1940	287,327	1955	570,653
1926	237,242	1941	333,225	1956	613,364
1927	180,394	1942	341,835	1957	612,755
1928	188,099	1943	337,912	1958	611,625*
1929	182,791	1944	342,832	1959	603,000[b]

* Revised figure.

a Compiled from figures by the U. S. Geological Survey, U. S. Bureau of Mines, the Illinois State Department of Mines and Minerals, and the Illinois State Geological Survey.

b Preliminary figure.

Table 3. - Average Prices of Illinois Mineral Products, 1939-1958[a,b]

Year	Coal (ton)	Crude oil (bbl.)	Limestone dolomite (ton)	Cement (bbl.)	Lime (ton)	Silica sand (ton)
1939	$ 1.64	$ 1.07	$ .92	$ 1.48	$ 7.23	$ 1.35
1940	1.69	1.06	.82	1.47	7.15	1.30
1941	1.81	1.30	.91	1.46	6.99	1.37
1942	1.91	1.36	.93	1.45	7.21	1.31
1943	2.13	1.37	.93	1.55	7.58	1.38
1944	2.23	1.39	1.00	1.55	7.78	1.39
1945	2.34	1.40	1.02	1.70	7.75	1.45
1946	2.61	1.59	1.08	1.76	8.45	1.51
1947	3.15	2.10	1.17	1.88	9.15	1.72
1948	3.88	2.77	1.26	2.04	10.60	1.91
1949	4.04	2.77	1.23	2.11	11.58	2.08
1950	4.05	2.77	1.21	2.19	12.15	2.13
1951	4.07	2.77	1.20	2.40	12.70	2.28
1952	4.10	2.77	1.27	2.40	12.84	2.30
1953	3.95	2.91	1.24	2.54	13.44	2.38
1954	3.82	3.00	1.27	2.57	13.95	3.07
1955	3.66	2.93	1.22	2.66	14.62	2.84*
1956	3.84	2.95	1.36	2.93	15.25	3.05*
1957	4.00	3.13	1.38	3.07	16.57	3.11*
1958	4.02	3.00	1.32	3.21	16.69	3.06

Year	Sand (ton)	Gravel (ton)	Fluorspar (ton)	Zinc (ton)	Lead (ton)	Silver (ounces)
1939	$ .40	$ .42	$ 21.77	$104.00	$ 94.00	$ .678
1940	.41	.44	22.10	126.00	100.00	.711
1941	.45	.46	22.85	150.00	114.00	.711
1942	.48	.52	26.59	186.00	134.00	.711
1943	.50	.49	31.66	216.00	150.00	.711
1944	.49	.49	33.79	228.00	160.00	.711
1945	.49	.49	34.06	230.00	172.00	.711
1946	.59	.57	35.55	244.00	218.00	.808
1947	.69	.58	36.78	242.00	290.00	.905
1948	.72	.65	36.64	266.00	358.00	.905
1949	.74	.65	38.23	248.00	316.00	.905
1950	.74	.68	39.52	278.00	266.00	.905
1951	.74	.75	45.49	364.00	346.00	.905
1952	.72	.71	50.35	332.00	322.00	.905
1953	.74	.76	52.46	218.00	266.00	.905
1954	.73	.78	55.54	216.00	274.00	.905
1955	.77	.85	47.12	246.00	298.00	.905
1956	.75	.83	47.51	274.00	314.00	.905
1957	.77	.86	51.94	232.00	286.00	.905
1958	.90	.95	52.15	204.00	234.00	.905

* Revised figures.
a Source: Illinois State Geological Survey Mineral Production Reports.
b Subject to revision.

Illinois for each year from 1915 through 1959. Figure 2 compares graphically the total mineral output for the years 1952-1959.

Average prices at the source are given in table 3 for each of twelve Illinois mineral products for the years 1939 through 1958.

Table 4 shows the percentage of the total value contributed by the various segments of the Illinois mineral industry from 1939 through 1958. Further information regarding many of the mineral products of Illinois will be found in the following tables, charts, and maps.

Table 4. - Percentage of Total Value Contributed by Various Segments of the Illinois Mineral Industry, 1939-1958[a]

Year	Coal	Petroleum products	Stone products	Clay products	Sand and gravel	Fluorspar and metals	Total percent
1939	36.3	47.3	7.4	5.4	2.8	0.8	100
1940	30.2	55.0	5.7	5.7	2.3	1.1	100
1941	30.1	52.9	6.5	6.1	3.0	1.4	100
1942	36.7	44.2	7.5	5.9	3.8	1.9	100
1943	46.6	36.3	6.0	5.4	3.4	2.3	100
1944	50.4	34.2	5.4	4.7	3.0	2.3	100
1945	49.9	33.3	6.2	5.7	2.7	2.2	100
1946	43.9	33.2	8.5	8.7	3.5	2.2	100
1947	46.9	32.9	7.7	7.4	3.1	2.0	100
1948	45.2	34.5	7.5	7.9	3.0	1.9	100
1949	39.4	38.7	8.6	7.8	3.4	2.1	100
1950	43.0	33.6	8.2	9.0	3.5	2.7	100
1951	41.2	32.6	9.2	9.9	3.7	3.4	100
1952	37.4	35.2	11.3	8.7	4.0	3.4	100
1953	36.2	36.7	11.4	9.2	4.0	2.5	100
1954	30.7	41.6	11.8	9.1	4.9	1.9	100
1955	29.3	42.7	11.3	9.6	4.5	2.6	100
1956	30.0	40.6	12.2	9.6	5.0	2.6	100
1957	30.5	40.1	12.3	9.9	4.8	2.4	100
1958	28.7	40.5	13.7	9.0	5.8	2.3	100

a Source: Illinois State Geological Survey Mineral Production Reports.

COAL INDUSTRY

Illinois for many years has ranked as the fourth largest coal producing state in the nation (table 7). The only states that produce greater tonnages of coal are West Virginia, Pennsylvania, and Kentucky (fig. 3). During 1959 Illinois produced more than 45.3 million tons of coal, more than 11 percent of all coal produced in the United States.

According to a list of the 50 biggest bituminous coal mines in the United States, ranked by 1959 tonnage, the state of Illinois placed nine mines in this group. The top ranking mine in the country was an Illinois mine that produced 3.7 million tons of coal. The other eight Illinois mines in this list ranked as follows: 4, 12, 16, 21, 27, 36, 46, and 47. As a group these nine mines produced 17.7 million tons of coal, which was 20 percent of the total coal produced by the 50 largest

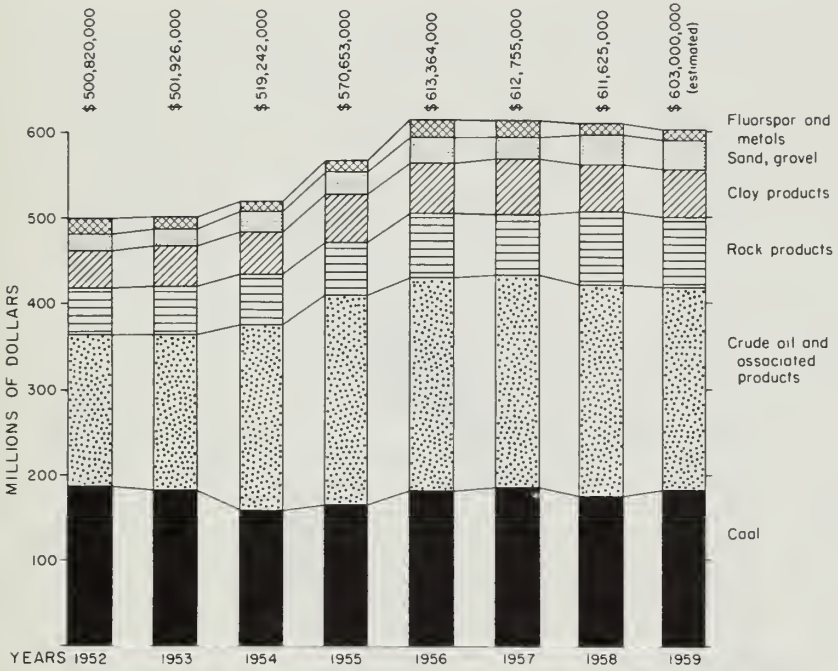

Fig. 2 - Value of Illinois mineral production compared for 1952 to 1959.

mines in the United States, and was 39 percent of the total coal produced in Illinois during the year 1959. The Illinois mine which ranked 47 in the list of 50 mines produced a total of more than 1.2 million tons of coal.

The value of the coal produced in Illinois during 1959 was estimated at more than 183 million dollars, or about 30 percent of the entire value of the state's mineral output, and an increase of more than 7 million dollars over the 1958 value of coal. Although the annual value of crude oil produced in Illinois has exceeded the annual value of coal in recent years (table 4), the substantial reserves and nearby markets assure a long future for the Illinois coal industry. In fact, the calculated reserves of minable bituminous coal in Illinois amount to some 137 billion tons.

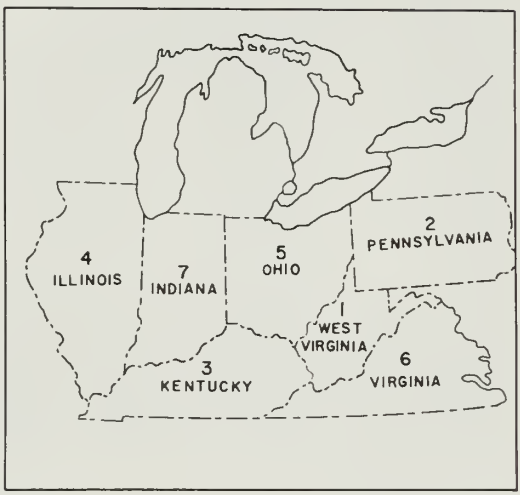

Fig. 3 - States that produced 90 percent of the nation's bituminous coal in 1959.

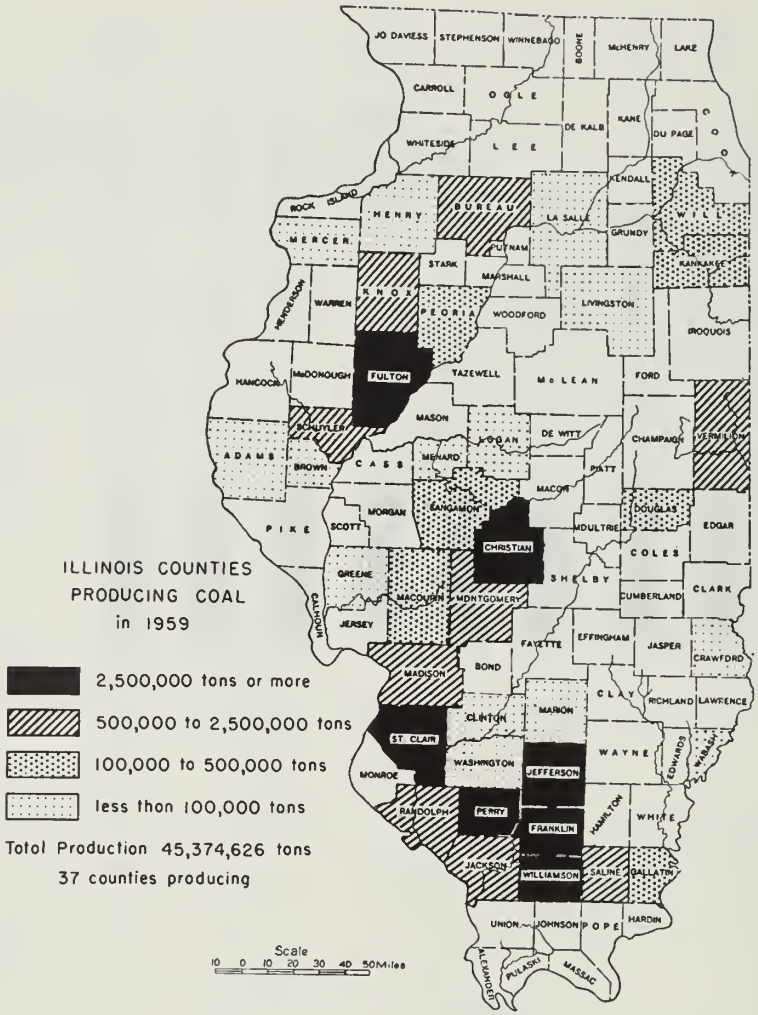

Fig. 4 - Illinois coal production by counties in 1959.

Almost 300 years ago the first recorded discovery of coal in the United States was made in Illinois. Several of the early explorers of this region, Joliet, Marquette, and Hennepin, had set down on their maps the discovery of coal here. Father Hennepin, one of the earliest explorers in the Mississippi Valley, mentioned the discovery of coal in the valley of the Illinois River, not far from the site of the city of Ottawa.

Actually, however, the first shipment of coal to be mined in Illinois, of which there is any record, occurred in Jackson County on the Big Muddy River in 1810, when a flatboat load of coal was sent to the New Orleans market.

Table 5. - Illinois Coal Production by Counties in 1959[a]

County	Number of mines	Tons mined		Total tons	Total value[b]
		Underground	Strip		
Adams	1	-	37,087	37,087[c]	$ 149,832
Brown	2	-	1,560	1,560	6,302
Bureau	1	-	517,958	517,958	2,092,550
Christian	1	3,764,147	-	3,764,147	15,207,154
Clinton	1	37,843	-	37,843	152,886
Crawford	1	-	113	113	457
Douglas	1	482,346	-	482,346	1,948,678
Franklin	4	4,609,972	-	4,609,972	18,624,287
Fulton	21	25,011	5,086,166	5,111,177	20,649,155
Gallatin	6	54,005	119,047	173,052	699,130
Greene	1	-	7,433	7,433	30,029
Henry	2	92,209	-	92,209	372,524
Jackson	5	637,839	608,208	1,246,047	5,034,030
Jefferson	2	3,111,124	23,180	3,134,304	12,662,588
Kankakee	1	-	533,207	533,207[d]	2,154,156
Knox	4	-	2,221,949	2,221,949	8,976,674
LaSalle	2	-	8,324	8,324	33,629
Livingston	1	-	1,181	1,181	4,771
Logan	1	24,611	-	24,611	99,428
Macoupin	2	375,174	-	375,174	1,515,703
Madison	2	610,892	-	610,892	2,468,004
Marion	1	23,428	-	23,428	94,649
Menard	3	14,276	-	14,276	57,675
Mercer	2	29,708	2,608	32,316	130,557
Montgomery	1	1,625,192	-	1,625,192	6,565,776
Peoria	10	25,181	304,464	329,645	1,331,766
Perry	6	4,306	2,543,572	2,547,878	10,293,427
Randolph	5	736,443	1,150,414	1,886,857	7,622,902
St. Clair	9	2,141,573	3,136,626	5,278,199	21,323,924
Saline	10	997,694	1,419,931	2,417,625	9,767,205
Sangamon	2	102,647	-	102,647	414,694
Schuyler	2	6,094	734,926	741,020	2,993,721
Vermilion	10	63,274	1,160,229	1,223,503	4,942,952
Wabash	1	-	1,317	1,317	5,321
Washington	2	25,181	-	25,181	101,731
Williamson	33	3,748,250	2,386,706	6,134,956	24,785,222
Total	159	23,368,420	22,006,206	45,374,626	$183,313,489

a Source: Production figures, Illinois State Department of Mines and Minerals.
b Average value for Illinois coal f.o.b. mine, estimated at $4.04 per ton, 1959.
c Formerly carried in Hancock County.
d Includes 206,823 tons mined in Will County.

Table 6. - Coal Production by Illinois Counties, 1882-1959[a]

County	Total production (tons)	Total years active	Last year active	County	Total production (tons)	Total years active	Last year active
Adams	83,273	16	1959	Menard	13,414,916	78	1959
Bond	7,355,569	57	1942	Mercer	15,051,457	72	1959
Brown	62,467	36	1959	Monroe	8,284	13	1941
Bureau	52,270,965	75	1959	Montgomery	91,143,802	78	1959
Calhoun	96,247	27	1912	Morgan	190,787	64	1951
Cass	212,477	53	1941	Moultrie	2,032,236	16	1924
Christian	235,054,958	75	1959	Peoria	67,614,719	78	1959
Clark	4,482	2	1955	Perry	177,021,192	78	1959
Clinton	38,620,028	78	1959	Pike	5,081	8	1942
Coles	198,932	6	1888	Pope	1,562	11	1938
Crawford	44,899	14	1959	Putnam	10,071,893	29	1938
Douglas	3,243,355	14	1959	Randolph	76,814,475	78	1959
Edgar	915,698	41	1952	Richland	154	1	1890
Effingham	796	1	1890	Rock Island	3,846,169	67	1948
Franklin	490,559,297	61	1959	St. Clair	244,785,381	78	1959
Fulton	200,250,346	78	1959	Saline	200,319,517	78	1959
Gallatin	5,621,773	75	1959	Sangamon	232,986,790	78	1959
Greene	659,253	76	1959	Schuyler	4,233,456	77	1959
Grundy	40,872,430	77	1958	Scott	612,476	61	1942
Hamilton	22,097	16	1905	Shelby	4,119,763	67	1950
Hancock	771,281	72	1958	Stark	1,227,280	69	1952
Hardin	40	1	1890	Tazewell	17,633,802	75	1956
Henry	22,459,073	78	1959	Vermilion	155,239,258	78	1959
Jackson	88,077,361	78	1959	Wabash	188,437	31	1959
Jasper	23,739	11	1939	Warren	685,466	73	1954
Jefferson	25,100,428	56	1959	Washington	17,891,390	78	1959
Jersey	120,350	59	1951	White	1,676,741	36	1940
Johnson	244,004	52	1956	Will	37,760,556	78	1959
Kankakee	8,062,229	40	1959	Williamson	330,505,512	78	1959
Knox	37,156,976	78	1959	Woodford	7,810,160	70	1951
LaSalle	65,546,753	78	1959	Total (1882-1959) . . .			3,558,474,032
Livingston	10,111,089	78	1959				
Logan	14,360,305	75	1959	Estimated production (1833-1881) . . .			73,386,123
Macon	11,000,468	65	1947				
Macoupin	262,801,341	78	1959				
McDonough	2,634,903	69	1951	Total production (1833-1959) . . .			3,631,860,155
McLean	5,544,139	47	1928				
Madison	161,729,538	78	1959				
Marion	39,171,820	78	1959				
Marshall	12,516,141	70	1951				

a Source: Illinois State Department of Mines and Minerals.

Table 7. - National Production of Bituminous Coal, 1956-1959[a]
(thousands of tons)

State	1956	1957*	1958*	1959[b]	Percent of 1959 total
West Virginia	155,891	156,842	119,468	118,000	28.8
Pennsylvania	90,287	85,365	67,771	65,900	16.1
Kentucky	74,555	74,667	66,312	64,800	15.8
Illinois	48,102	46,993	43,912	45,500	11.1
Ohio	38,934	36,862	32,028	34,800	8.5
Virginia	28,063	29,506	26,826	28,900	7.0
Indiana	17,089	15,841	15,022	14,600	3.5
Alabama	12,663	13,260	11,182	11,700	2.9
Tennessee	8,848	7,955	6,785	5,400	1.3
Utah	6,522	6,858	5,328	4,400	1.1
Total	480,954	474,149	394,634	394,000	96.1
All other states	19,920	18,555	15,812	16,000	3.9
Grand total	500,874	492,704	410,446	410,000	100.0

* Revised figures.
a Source: U. S. Bureau of Mines.
b Preliminary figures.

Production

The record of coal production in Illinois for 1959 is shown in tables 5 and 6. Table 5 summarizes the 1959 production by giving a complete county-by-county tabulation of coal produced, type of mining (strip or underground), number of mines, and the approximate value of the product. It also shows that of the 37 coal-producing counties, 13 produced more than one million tons each for a combined total of about 90 percent of the state's output for 1959 (fig. 4).

Coal production by stripping methods, important in only a few counties a decade ago, predominated in a number of counties during 1959. In fact, the total quantity of coal produced by this method in Illinois during 1959 was 22 million tons, or 48 percent of the state's entire output. Table 5 indicates the counties where this method of mining was important.

In the year 1918 Illinois mines produced a record total of almost 90 million tons of coal which was valued at about 207 million dollars. The coal in that year was produced from 967 mines. Of these mines, 370 mined and shipped 98 percent of all the coal, whereas 597 mines produced the 2 percent that was used locally. In 1918 these mines employed a total of 91,372 men, each of whom was responsible, on an average, for producing almost 1,000 tons of coal during the year. By contrast, during 1959 only 159 mines produced 45.3 million tons of coal, employing a total of 10,897 men, each of whom produced an average of more than 4,100 tons of coal during the year.

The accumulated production of coal by counties since 1882, when mining records were begun, is shown in table 6. Of the 70 counties that have a coal production record during this 78-year period, 11 counties have accounted for three-

fourths of the state's entire output, each producing more than 100 million tons of coal. Table 6 also records the total number of years that each county has produced coal since 1882 and the last year it produced coal. A grand total of more than 3.5 billion tons of coal was produced in Illinois during the 78-year period, 1882-1959.

Markets

Total coal output is somewhat below its level of 15 or 20 years ago, but the year-to-year fluctuations of output tend to be smaller than formerly because of the changed character of the market. Today, railroad consumption of coal has dwindled to a negligible amount. Retail deliveries of coal now require about 10 percent of the total coal marketed in the United States. The industrial consumption of coal has remained remarkably firm for several years at about 25 percent of the total marketed. Coal used for the production of coke, and for miscellaneous uses, require about 25 percent of the marketed coal.

The electric utilities in this country now consume about 40 percent of the present coal marketed, and within a few years their fuel needs are expected to take at least half the coal marketed in the United States. Because the electric utilities usually arrange to purchase their coal under long-term contract, they give an area of stability to the coal market and thus permit long range planning in coal production.

Future markets for coal in the United States will, no doubt, require substantial quantities of thoroughly prepared fuel for specialized purposes. In order to supply such markets with adequate quantities of the required grade of coal, the industry in this country maintains a continuous program of technological improvement. This program includes the establishment of high-capacity new mines, and the employment of modern, high-capacity mining machines and processing equipment for maximum efficiency in coal production.

PETROLEUM INDUSTRY

Illinois, as a producer of crude oil, has ranked among the ten top producing states of the United States for a number of years, and during 1959 it held eighth position. It is also the leading producer among states lying principally east of the Mississippi River. Table 10 shows that the state of Texas is the top producer of crude oil in the nation. In fact it would require the combined output of the next four oil-producing states — Louisiana, California, Oklahoma, and Wyoming — to equal the Texas output. The remaining five of the first ten oil producers — Kansas, New Mexico, Illinois, Mississippi, and Colorado — contribute only 15.5 percent of the nation's crude oil production.

The year 1959 ended with an almost complete rearrangement of the positions held by the leading oil producing states. Texas led by far, while Louisiana gained second place and California dropped to third place. The state of Oklahoma held fourth position, but Wyoming was fifth, displacing Kansas to sixth position. New Mexico was seventh and Illinois eighth; however, Mississippi gained ninth position, making Colorado last in the list of the leading ten oil-producing states.

Table 11 indicates the estimated crude oil reserves in Illinois and in some other states, and table 12 gives the estimated natural gas reserves known in the several states listed. Each year the industry makes a survey of the amount of oil or gas reserve known to exist and that can be produced under current conditions of price and production practices. The figures given in these tables represent only known reserves of oil or gas as of a given date.

Production

Illinois crude oil, together with the associated products, gas and liquefied petroleum gases, accounted for about 39 percent of the state's total mineral product in 1959. Oil production in Illinois for 1959 was estimated to be 76.7 million barrels, or some four million barrels less than was produced in 1958. The average value for Illinois oil was estimated at $3.00 per barrel for 1959, bringing its total value to more than 230 million dollars.

Wells drilled for oil in the Illinois fields declined about 12 percent in 1959, but oil production continued at a substantial rate because of the use of secondary recovery methods. About 50 percent of the total crude oil produced in Illinois during 1959 was by means of hydraulic fracturing and waterflooding recovery. The waterflood technique involves injecting water into the oil-bearing rock formation to flush out much more oil than could otherwise be pumped out. Hydraulic fracturing is used in wells drilled in tight or dense oil-bearing formations. A mixture of oil and sand is forced into the formation under high pressure which fractures the rock around the drill hole, increasing its effective diameter, thus allowing a more complete recovery of oil.

Table 8. - Illinois Well Completions and Production, 1936-1959

Year	Completions[a]	Producing wells		Production[b,c] (thousands of barrels)
		Number	Percent of completions	
1936	93	52	56.0	4,445
1937	449	292	65.0	7,426
1938	2,536	2,010	79.0	24,075
1939	3,617	2,970	82.0	94,912
1940	3,755	3,080	82.0	147,647
1941	3,807	2,925	77.0	134,138
1942	2,017	1,179	58.0	106,590
1943	1,791	1,090	61.0	82,256
1944	1,991	1,229	62.0	77,413
1945	1,763	1,094	62.0	75,210
1946	2,362	1,387	59.0	75,297
1947	2,046	1,102	54.0	66,459
1948	2,489	1,316	53.0	64,808
1949	2,741	1,447	53.0	64,501
1950	2,894	1,328	46.0	62,028
1951	2,383	947	40.0	60,244
1952	2,077	854	41.0	60,071
1953	2,161	1,161	54.0	59,025
1954	3,254	1,896	58.0	66,940
1955	3,885	2,164	56.0	81,131
1956	3,640	1,742	48.0	82,314
1957	2,585	1,114	43.0	76,649
1958	2,291	1,066	46.5	80,779
1959	2,032	1,034	51.0	76,727

a Includes only oil and gas producers and dry holes.
b Based on information furnished by oil and pipeline companies.
c From U. S. Bureau of Mines through 1950.

Table 9. - Estimated Oil Production by Illinois Counties in 1959[a]

County	Production		Value[b] in thousands of dollars
	Thousands of barrels	Percent of state total	
Adams	5	0.01	$ 15
Bond	424	0.55	1,272
Brown	20	0.02	60
Christian	2,068	2.70	6,204
Clark-Cumberland	1,856	2.42	5,568
Clay	3,614	4.71	10,842
Clinton	2,876	3.75	8,628
Coles	401	0.52	1,203
Crawford	3,481	4.54	10,443
Douglas	225	0.30	675
Edgar	87	0.11	261
Edwards	1,436	1.87	4,308
Effingham	417	0.54	1,251
Fayette	12,958	16.89	38,874
Franklin	2,026	2.64	6,078
Gallatin	2,120	2.76	6,360
Hamilton	2,409	3.14	7,227
Hancock-McDonough	59	0.08	177
Jasper	1,211	1.58	3,633
Jefferson	2,339	3.05	7,017
Lawrence	7,003	9.13	21,009
Macon	48	0.06	144
Macoupin	17	0.02	51
Madison	325	0.42	975
Marion	7,545	9.83	22,635
Montgomery	3	-	9
Moultrie	3	-	9
Perry	43	0.06	129
Randolph	173	0.23	519
Richland	2,191	2.86	6,573
St. Clair	8	0.01	24
Saline	899	1.17	2,697
Sangamon	24	0.03	72
Shelby	68	0.09	204
Wabash	2,493	3.25	7,479
Washington	780	1.02	2,340
Wayne	6,778	8.83	20,334
White	8,266	10.77	24,798
Williamson	28	0.04	84
Total	76,727	100.00	$ 230,181

a Subject to revision.
b Average price estimated at $3.00 per barrel.

Table 10. - National Production of Crude Oil, 1956-1959[a]
(thousands of barrels)

State	1956	1957	1958*	1959[b]	Percent of 1959 total
Texas	1,107,808	1,073,867	940,166	983,840	38.2
California	350,754	339,646	313,672	307,327	11.9
Louisiana	299,421	329,896	313,891	354,611	13.8
Oklahoma	215,862	214,661	200,699	196,487	7.6
Kansas	124,204	123,614	119,942	119,514	4.6
Wyoming	104,830	109,584	115,572	125,968	4.9
New Mexico	87,893	94,759	98,515	105,692	4.1
Illinois	82,346	77,083	80,275	78,435	3.1
Colorado	58,516	54,982	48,736	46,150	1.8
Mississippi	40,824	38,922	39,512	47,928	1.9
Total	2,472,458	2,457,014	2,270,980	2,365,952	91.9
All other states	144,825	159,887	178,007	208,638	8.1
Grand total	2,617,283	2,616,901	2,448,987	2,574,590	100.0

* Revised figures.
a Source: U. S. Bureau of Mines.
b Preliminary figures.

Table 11. - Estimates of Proved Oil Reserves in Illinois and Other States, 1957-1960[a]
(millions of barrels)

State[b]	1957	1958	1959	1960	Approximate change from 1959
Illinois	700	655	608	594	- 14
Indiana	68	67	71	74	+ 3
Kansas	992	947	922	917	- 5
Kentucky	148	138	126	136	+ 10
Louisiana	3,675	3,857	4,044	4,660	+616
New Mexico	835	832	894	1,026	+132
Oklahoma	2,010	1,942	1,898	1,865	- 33
Texas	14,783	14,555	14,322	14,860	+538
Wyoming	1,363	1,420	1,409	1,403	- 6
All other states	5,860	5,887	6,242	6,184	- 58
United States	30,434	30,300	30,536	31,719	+1,183

a Source: American Petroleum Institute.
b Figures as of January 1, each year.

Table 12. - Estimates of Natural Gas Reserves in Illinois and Other States, 1957-1960[a] (billions of cubic feet)

State[b]	1957	1958	1959	1960	Approximate change from 1959
Illinois	220	166	170	175	+ 5
Indiana	34	31	31	35	+ 4
Kansas	17,566	19,296	20,234	19,981	- 253
Kentucky	1,246	1,225	1,215	1,159	- 56
Louisiana	45,054	51,436	55,112	59,854	+ 4,742
New Mexico	23,473	22,258	21,180	17,913	- 3,267
Oklahoma	13,775	14,259	15,207	16,651	+ 1,444
Texas	112,729	113,084	115,046	120,476	+ 5,430
Wyoming	3,236	3,457	3,650	3,847	+ 197
All other states	20,442	21,357	22,297	22,506	+ 209
United States	237,775	246,569	254,142	262,597	+ 8,455

a Source: American Gas Association.
b Figures as of January 1, each year.

In August 1859, the first oil well in the United States was drilled near Titusville, Pennsylvania, and the resulting oil fever of the 1860's spread into Illinois. However, nothing was discovered in Illinois except some oil showings in two or three places. A second spread of oil fever in the 1880's resulted in production of oil at Litchfield and the discovery of gas at Sparta and near Pittsfield. During the years from 1900 to 1904 several unsuccessful tests were made in Crawford county, but finally, in the spring of 1904, drilling in Clark County brought in a producing well. About 100 square miles were drilled in Clark County in 1905, of which about 60 square miles proved productive.

In the light of the Clark County success, prospecting was renewed in Crawford County with the result that a 250-barrel well was completed in 1906. This well was the predecessor of many successful wells that soon gave Illinois third rank in oil production in the United States.

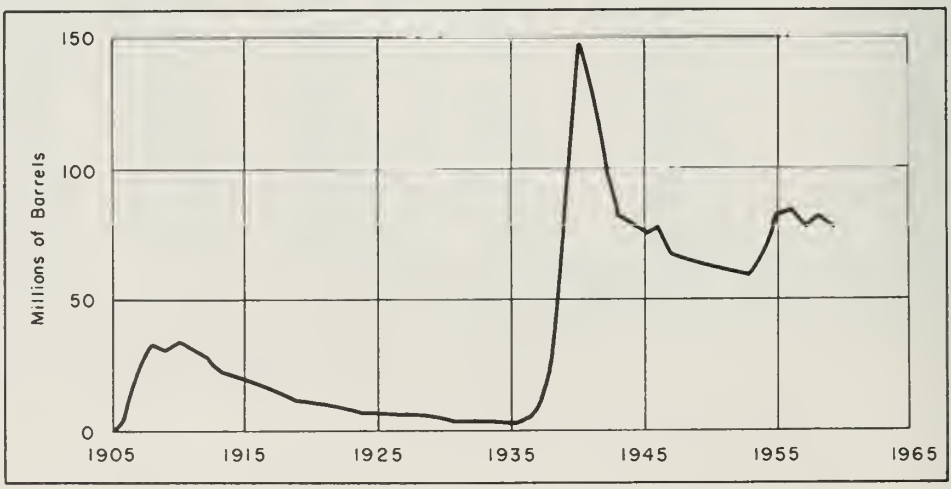

Fig. 5 - Illinois production of crude oil, 1905-1959.

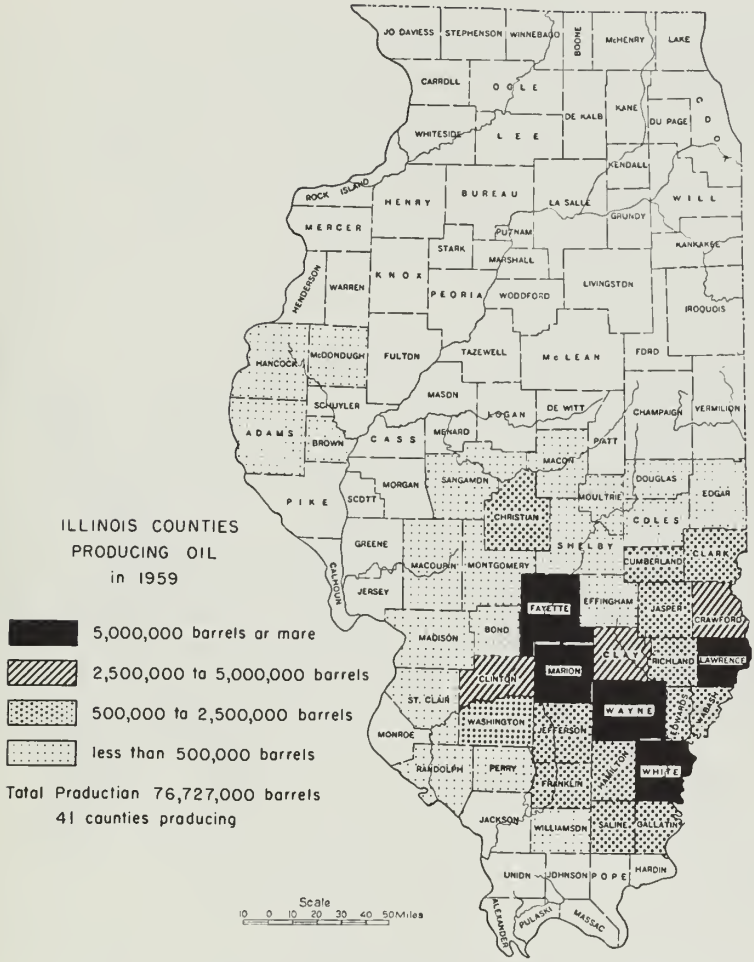

Fig. 6 - Illinois oil production by counties in 1959.

The first major period of oil activity in Illinois occurred during the years from 1905 to about 1912, and reached peak production in 1908 when some 33.6 million barrels of oil was produced. Oil production from the original southeastern fields gradually diminished and reached a low point about 1935 (fig. 5).

In 1935 an intensive search for new oil fields began in downstate Illinois. After many months of scientific exploration the first test wells were put down early in 1937, and their successful completion resulted in a rapid drilling campaign with many new pools being discovered in a series of counties to the west of the original southeastern Illinois area. Thus, the second major period of oil activity occurred from 1937 to about 1941. An all-time peak of production occurred in 1940 when 147.6 million barrels of oil was produced. In 1940 Illinois ranked fourth in the nation in oil production, and was exceeded only by Texas, California, and Oklahoma.

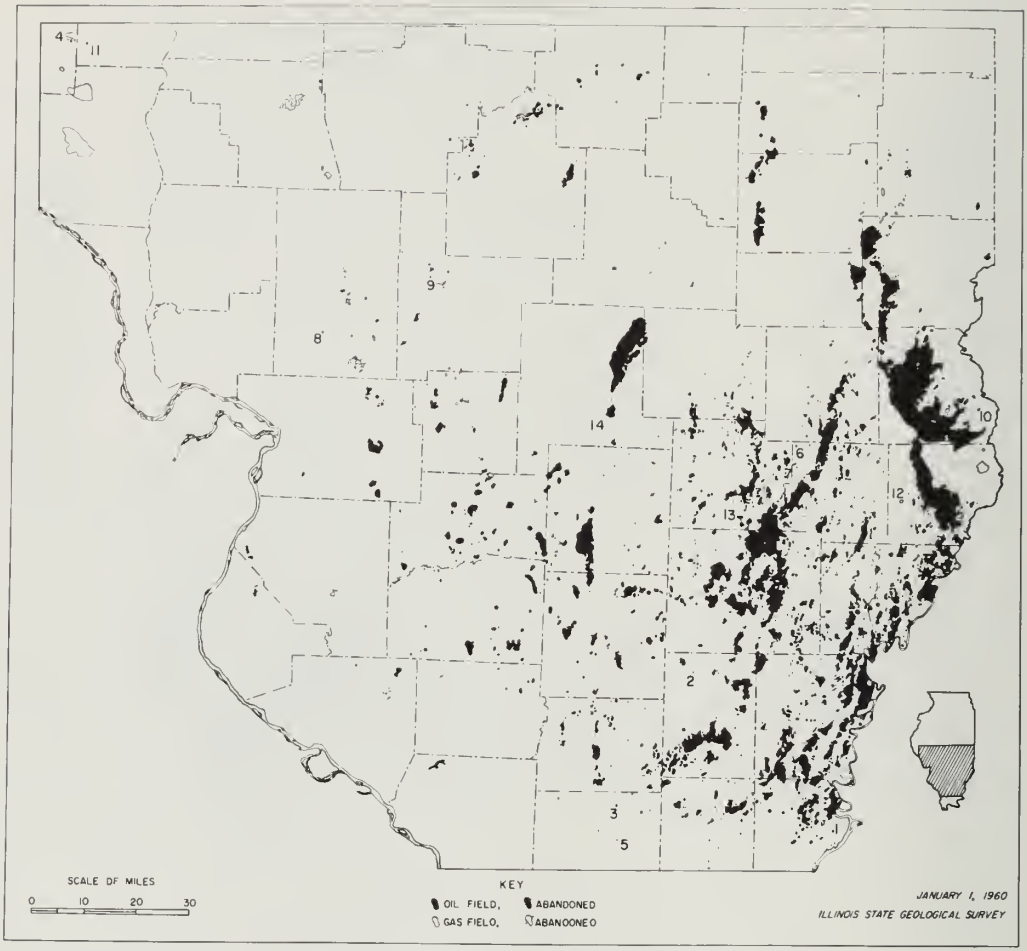

Fig. 7 - Oil and gas pools discovered in Illinois in 1959.

1 - Ab Lake South
2 - Belle Prairie West
3 - Johnston City East
4 - Kellerville
5 - Marion East
6 - Passport North
7 - Pixley
8 - Plainview South
9 - Raymond South*
10 - Richwood (gas)
11 - Siloam
12 - Sumner South (gas)
13 - West Seminary
14 - Wilberton

*Raymond South was abandoned in September 1959.

Table 8 gives a summary of well completions and production since 1936, the year just prior to the beginning of increased activity in Illinois' new oil fields. Of special interest are table 9 and figure 6. The table gives the estimated amount of oil produced from Illinois counties for the year 1959. The percentage of the state's total oil that each county produced and its approximate value are also shown. The map (fig. 7) which outlines most of southern Illinois and indicates the extent of the Illinois oil basin, shows the relative sizes of the various oil fields, together with the new fields discovered in 1959.

STONE, SAND, AND GRAVEL

Crushed stone, from limestone and dolomite, is the most important stone product in Illinois. The material is used in selected sizes for construction, highway building, railway roadbeds, agriculture, the chemical and metallurgical industries, cement and lime manufacture, and for several minor uses.

In general, stone producers in Illinois are well placed geographically to supply the demand; however, production figures show that broad areas of the state must look chiefly to the border counties for their stone requirements. In the northwestern section of the state, many small producers supply the local markets, but in western Illinois, in the counties that border the Mississippi River, stone is produced in larger quantities.

In the area around and immediately south of East St. Louis are a number of large commercial stone producers who find markets for stone in the growing metropolitan areas of the region, the fertile farming area outside the St. Louis industrial district, and eastward in south-central Illinois. In northeastern Illinois, which includes the Chicago district and environs to the south and west, there are a number of large operations that ship stone by rail and truck to local markets as well as to more distant points in Illinois. The eastern and southeastern parts of the state have few producers of stone and most of their operations are relatively small.

The counties leading in the production of crushed stone for various purposes are Cook, DuPage, Kankakee, Livingston, Randolph, St. Clair, and Will. In 1958 each of these counties reported a production of more than one million tons, but Cook County led with a production of more than 12 million tons. Although only seven counties in the state produced more than one million tons of crushed stone, 56 counties (more than one-half the counties in the state) reported stone production for 1958.

What little information is available concerning the production of stone in Illinois during the 1860's points to the fact that 100 years ago the Chicago district, comprising Cook, Will, and Kankakee Counties, led all other areas of the state in stone production, and that the Mississippi River district has consistently held second place.

Each of these districts has stone deposits of good quantity and quality for construction purposes, and each district has adequate and cheap transportation, both rail and water. The reason for the marked supremacy of the Chicago district is not to be found in any particular advantage of this sort, but rather in the greater demand resulting from the much greater concentration of population and industry in the Chicago area.

However, in the earlier part of the last century, the relative importance of the two districts was just the reverse, because the spread of population was guided by the Mississippi River, and the population and demand were greater in that part of the state.

Just as the coming of the coal-buring railroad locomotive and the growth of the railroad system in Illinois opened up tremendous markets for Illinois coal, so the spread of rail and highway networks opened up tremendous markets for Illinois crushed stone and for sand and gravel. Huge quantities of stone and of sand and gravel have been used in the construction and maintenance of railway road beds, and the coming of the motor car and truck brought increased demands for stone needed in the construction and maintenance of motor highways. Furthermore, as the

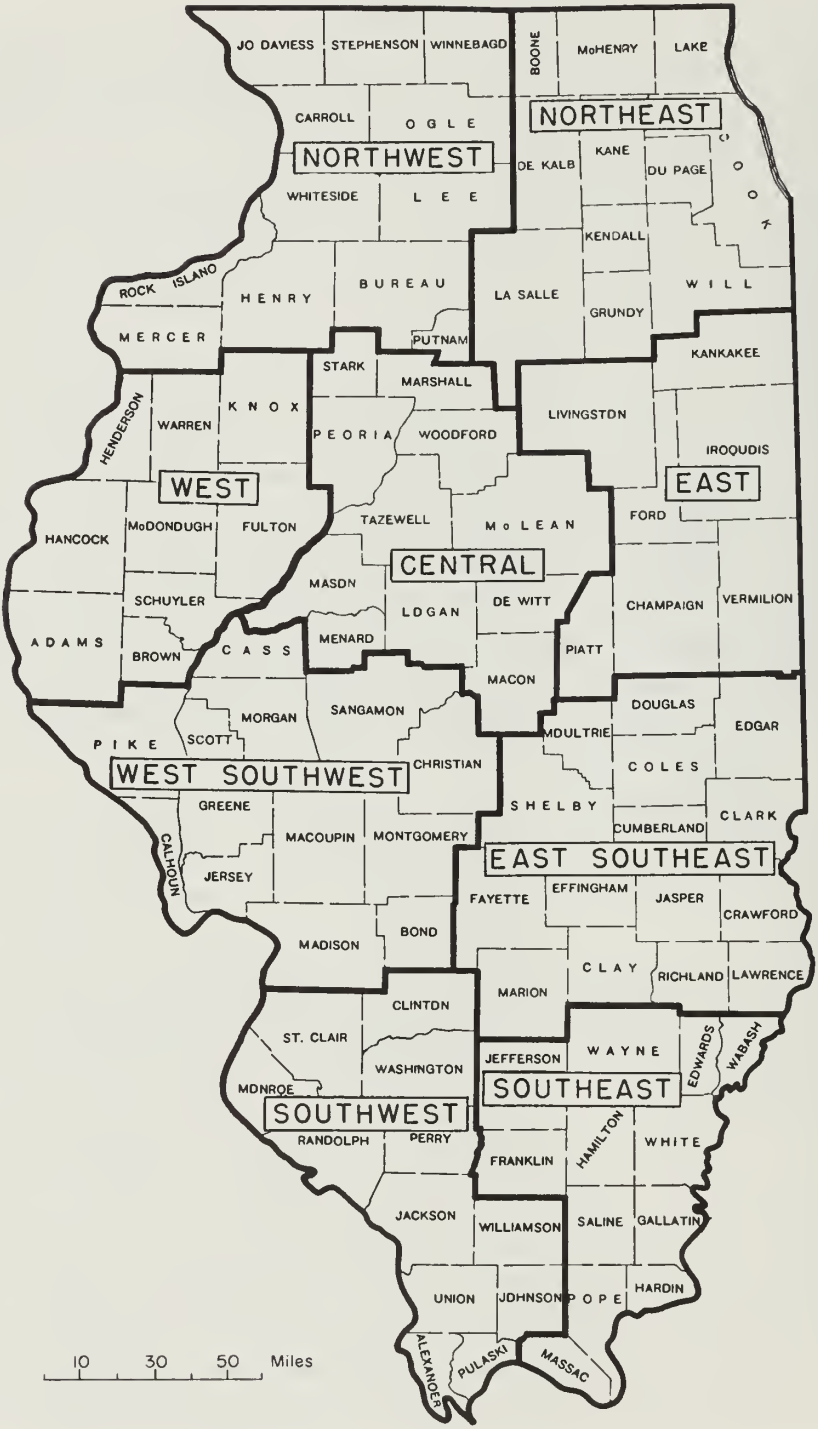

Fig. 8 - County outline map of Illinois showing area division.

density of traffic increased and as the speed and power of motor vehicles increased, old, narrow roads with sharp curves had to be replaced with new highways, suited to modern traffic conditions.

Along with the expanding railway and highway systems in the state there were also an increasing population and growing towns and cities throughout Illinois. Streets had to be paved, stores, schools, churches, houses, and factories had to be built, and as time passed and more people came, new structures of all kinds had to be built to provide for growing needs and to replace the old. The markets for Illinois building materials, including crushed stone, sand, gravel, and structural clay products, have been, and no doubt will continue to be, substantial.

Limestone and dolomite production in Illinois is summarized in table 13 which shows revised figures for 1958 and estimated figures for 1959. Reports from producers concerning their 1958 stone production were very complete; therefore, table 14 gives a detailed breakdown of stone production in Illinois according to region (fig. 8) and according to four major categories of use — stone for roads, building, agriculture, and all other uses. Also shown in this table is the name of every county reported to have had stone production as well as the average value at the quarry for all categories of stone in all regions. Table 14 illustrates the pattern of stone production in Illinois and shows in tabulated form many of the points mentioned in the foregoing text concerning stone production in this state.

Table 13. - Illinois Limestone and Dolomite Production, 1958-1959[a]

Stone use	1958*		1959[b]	
	Tons	Value	Tons	Value
Agstone	3,754,633	$ 5,327,908	3,250,000	$ 4,700,000
Construction and paving	26,435,908	33,643,306	23,700,000	30,300,000
Metallurgical and chemical	1,978,886	3,238,294	1,780,000	2,900,000
Railroad ballast	108,488	121,726	90,000	104,000
Other	786,874	1,544,857	680,000	1,361,000
Total	33,064,789	$43,876,091	29,500,000	$39,365,000

* Revised figures.
a Excluding stone used in manufacture of cement and lime.
b Estimated figures.

Soils supporting increased crop yields that result from the application of commercial fertilizers will ultimately require applications of agricultural limestone to replenish the calcium removed. Because agricultural limestone is an important commodity to the farmer and an important product of the quarry operator, the agstone column of table 14 should be of interest to these people and to others concerned with soil fertility.

Sand and Gravel

Common sand and gravel, found in many places as a part of the glacial deposits in Illinois, is used extensively in the construction industry, in building and maintaining highway and railway roadbeds, and for miscellaneous uses. Statistics of production, available for only comparatively recent years, make it difficult to

Table 14. - Illinois Limestone and Dolomite Production, by Regions, 1958[a,b]

Counties reporting[c]	Items	Crushed stone reported by uses				
		Road	Building	Agstone	All Other	Total
		NORTHWEST				
Carroll						
Jo Daviess						
Lee	Operations					56
Mercer	Tons	1,641,096	114,077	352,386	48,819	2,156,378
Ogle	Value	$1,753,505	$140,533	$440,967	$50,413	$2,385,418
Rock Island	Av. per ton	$1.07	$1.23	$1.25	$1.03	$1.11
Stephenson						
Whiteside						
Winnebago						
		WEST				
Adams						
Brown	Operations					21
Fulton	Tons	1,027,434	85,991	358,387	159,409	1,631,221
Hancock	Value	$1,346,235	$115,669	$502,728	$514,037	$2,478,669
Henderson	Av. per ton	$1.31	$1.35	$1.40	$3.22	$1.52
Knox						
McDonough						
Schuyler						
Warren						
		WEST SOUTHWEST				
Calhoun						
Christian	Operations					22
Greene	Tons	975,429	243,070	447,771	87,769	1,754,039
Jersey	Value	$1,534,677	$424,885	$707,933	$189,599	$2,857,094
Madison	Av. per ton	$1.57	$1.75	$1.58	$2.16	$1.63
Montgomery						
Pike						
Scott						
		SOUTHWEST				
Jackson						
Johnson	Operations					17
Monroe	Tons	2,635,792	263,558	686,534	2,115,031	5,700,915
Pulaski	Value	$4,065,698	$457,429	$982,649	$3,312,779	$8,818,555
Randolph	Av. per ton	$1.54	$1.74	$1.43	$1.57	$1.55
St. Clair						
Union						

a Revised figures for 1958.
b All values at the quarry.
c Refer to figure 8.

Table 14. - Continued[a,b]

Counties reporting[c]	Items	Crushed stone reported by uses				
		Road	Building	Agstone	All other	Total
		NORTHEAST				
Boone						
Cook						
DeKalb	Operations					23
DuPage	Tons	10,020,811	5,553,312	410,352	333,300	16,317,775
Kane	Value	$12,355,904	$6,590,797	$539,599	$388,921	$19,875,221
Kendall	Av. per ton	$1.23	$1.19	$1.31	$1.17	$1.22
LaSalle						
McHenry						
Will						
		EAST				
Kankakee	Operations					9
Livingston	Tons	1,994,688	364,363	833,525	98,135	3,290,711
Vermilion	Value	$2,258,702	$404,196	$1,051,953	$398,014	$4,112,865
	Av. per ton	$1.13	$1.11	$1.26	$4.06	$1.25
		CENTRAL				
Logan	Operations					6
Menard	Tons	670,162	-	254,710	-	924,872
Peoria	Value	$869,199	-	$423,354	-	$1,292,553
	Av. per ton	$1.30	-	$1.66	-	$1.40
		EAST SOUTHEAST				
Clark						
Clay	Operations					8
Coles	Tons	570,167[d]	-	314,654	-	884,821
Effingham	Value	$878,425	-	$534,254	-	$1,412,679
Shelby	Av. per ton	$1.54	-	$1.70	-	$1.60
		SOUTHEAST				
Hardin	Operations					6
Jefferson	Tons	307,743[e]	-	96,314	-	404,057
Massac	Value	$498,566	-	$144,471	-	$643,037
	Av. per ton	$1.62	-	$1.50	-	$1.59
		STATE TOTALS				
Counties reporting						56
Operations reported						168
Tons		19,843,322	6,624,371	3,754,633	2,842,463	33,064,789
Value		$25,560,911	$8,133,509	$5,327,908	$4,853,763	$43,876,091
Av. per ton		$1.29	$1.23	$1.42	$1.71	$1.33

a Revised figures for 1958.
b All values at the quarry.
c Refer to figure 8.
d Includes small amount of other stone.
e Includes negligible amount of building stone.

state a time for its first significant use in Illinois, although it would seem reasonable to place the beginnings of the industry at a period some 100 years ago.

Final production figures for common sand in 1958 and estimated figures for 1959 are summarized in table 15. Table 16 gives a detailed review of common sand production in Illinois according to region (fig. 8) and according to use. Tables 17 and 18 and figure 8 give for gravel the same kind of information as described for sand.

Table 15. - Illinois Common Sand Production, 1958-1959[a]

Sand use	1958*		1959[b]	
	Tons	Value	Tons	Value
Building	5,948,401	$ 5,509,315	5,750,000	$ 5,300,000
Road	4,998,787	4,444,105	4,500,000	4,100,000
Other	514,344	407,040	450,000	375,000
Total	11,461,532	$10,360,460	10,700,000	$ 9,775,000

* Revised figures.
a Exclusive of silica sand and natural bonded molding sand.
b estimated figures.

The demand for sand and gravel is being complicated by a decrease in available deposits in some areas. Zoning regulations have restricted or blocked production in many localities. Some areas that are underlain by potentially useful deposits of sand and gravel are occupied by homes, factories, and highways. Another important consideration is economic availability. The sand and gravel industry is essentially local because transportation costs restrict producers to a limited market area. If producers must ship this material excessive distances, there will be marked increases in price and construction costs. However, Illinois is fortunate in possessing substantial deposits of sand and gravel reasonably accessible to the principal market areas.

Special sands in Illinois include silica sand and natural bonded molding sand. Silica sand, which is produced in substantial quantities in LaSalle County and in lesser amounts in Ogle County, is a nearly pure quartz sand which finds a very important use in the manufacture of glass. Silica sand, when tempered by the addition of clay or other binding material, is used as a molding sand for the casting of metals. Silica sand is also used for many other special jobs, some of which are listed in the footnotes of table 19. Ground silica sand, or silica flour, made by grinding the sand, is used in paints and as facing sand for molds; it is also used as an abrasive.

Natural-bonded molding sand can be used in molds practically as it comes from the pit and does not have to be mixed with a binding substance. Because molding sand, whether natural or compounded, is very important in the metal industries, it must possess special properties. A good molding sand must have the right surface and it must not collapse when heavy metal is poured into the mold. Also, it must not fuse, burn, or sinter, and must not become unfit for re-use.

Although the following comment could be applied to virtually all of the mineral raw materials produced in Illinois, it is perhaps especially applicable in connection with the sand and gravel industry. Such industries depend on at least one of the following factors for its development: large population to afford a market,

Table 16. - Illinois Common Sand Production by Regions, 1958[a,b]

Counties reporting[c]	Items	Common sand reported by uses			
		Road	Building	All Other	Total
		NORTHWEST			
Bureau					
Carroll					
Henry					
Jo Daviess	Operations				28
Lee	Tons	609,406	1,118,085	101,820	1,829,311
Ogle	Value	$443,430	$798,636	$66,653	$1,308,719
Rock Island	Av. per ton	$.73	$.71	$.65	$.72
Stephenson					
Winnebago					
		WEST			
Adams	Operations				8
Brown	Tons	39,990	76,000	61,529	177,519
Fulton	Value	$25,399	$66,041	$66,037	$157,477
Knox	Av. per ton	$.64	$.87	$1.07	$.89
		CENTRAL			
DeWitt					
Logan					
Macon	Operations				15
Marshall	Tons	671,565	902,903	141,187	1,715,655
McLean	Value	$611,968	$783,148	$122,654	$1,517,770
Peoria	Av. per ton	$.91	$.87	$.87	$.88
Tazewell					
		WEST SOUTHWEST			
Bond					
Calhoun	Operations				12
Madison	Tons	264,705	372,340	62,370	699,415
Pike	Value	$212,580	$317,241	$63,269	$593,090
Sangamon	Av. per ton	$.80	$.85	$1.01	$.85
Scott					
		SOUTHWEST			
Alexander	Operations				4
Jackson	Tons	343,696	171,579	35,978	551,253
Randolph	Value	$295,455	$151,062	$28,986	$475,503
St. Clair	Av. per ton	$.86	$.88	$.81	$.86

a Revised figures for 1958.
b All values at the pit.
c Refer to figure 8.

Table 16. - Continued[a,b]

Counties reporting[c]	Items	Common sand reported by uses			
		Road	Building	All Other	Total
		NORTHEAST			
Boone					
Cook					
DeKalb					
DuPage					
Grundy	Operations				30
Kane	Tons	3,847,336	2,160,385	92,991	6,100,712
Kendall	Value	$3,784,580	$2,149,018	$47,652	$5,981,250
Lake	Av. per ton	$.98	$.99	$.51	$.98
LaSalle					
McHenry					
Will					
		EAST			
Champaign	Operations				5
Ford	Tons	32,881	83,708	12,946	129,535
Kankakee	Value	$29,559	$88,790	$8,745	$127,094
Vermilion	Av. per ton	$.90	$1.06	$.68	$.98
		EAST SOUTHEAST			
Clark					
Coles	Operations				8
Crawford	Tons	39,825	61,967	5,523	107,315
Cumberland	Value	$32,356	$43,484	$3,044	$78,884
Fayette	Av. per ton	$.81	$.70	$.55	$.74
Lawrence					
		SOUTHEAST			
Wabash	Operations				6
White	Tons	98,997	51,820[d]	-	150,817
	Value	$73,988	$46,685	-	$120,673
	Av. per ton	$.75	$.90	-	$.80
		STATE TOTALS			
Counties reporting					53
Operations reported					116
Tons		5,948,401	4,998,787	514,344	11,461,532
Value		$5,509,315	$4,444,105	$407,040	$10,360,460
Av. per ton		$.93	$.89	$.79	$.90

a Revised figures for 1958.
b All values at the pit.
c Refer to figure 8.
d Includes small amount of other sand.

adequate transportation facilities, an advanced stage in the manufacturing industry, and abundant capital for establishment and upkeep. Industries depending on the above factors would not be considered frontier industries.

Table 17. - Illinois Gravel Production, 1958-1959[a]

Gravel use	1958*		1959[b]	
	Tons	Value	Tons	Value
Building	3,974,729	$ 3,924,548	4,225,000	$ 4,200,000
Road	11,235,523	10,440,516	9,275,000	8,900,000
Railroad ballast	432,635	362,004	415,000	300,000
Other	935,570	969,019	860,000	675,000
Total	16,578,457	$15,696,087	14,775,000	$14,075,000

* Revised figures.
a Common gravel.
b Estimated figures.

CLAY PRODUCTS

Clay products as manufactured in Illinois today include such items as face brick and common brick, sewer pipe and drain tile, flue pipe, building tile, vitreous plumbing fixtures, glazed tile, electrical porcelains, and pottery and whiteware. Also included in the list of Illinois clay products are the various forms of special heat-resistant firebrick and silica brick as used by the metallurgical industries. Table 20 gives a summary of clay products produced for the years 1958 and 1959.

Given in table 21 is a list of the number of clay products plants in Illinois located according to county, reporting production for the year 1959. The county outline map of Illinois (fig. 8) shows the nine sections of the state used in tabulating this list of operators.

No exact date can be set for the first use of clay in Illinois — the Indians made use of it long before the coming of white men — for example, fragments of clay evaporating pans have been found around the old brine springs in Gallatin County. Even the early use of clay as a plaster for chinks in the pioneer's homes can not be considered as any real development of the resources, and it was probably not until after 1818 that systematic exploration began.

The clay working industries, once begun, followed an interesting pattern of development. In the early days neither the great bulk of the state's clay resources nor the need for brick for construction and tile for drainage were apparent while the population was still confined largely to the wooded areas along major stream lines. As the clay products industry grew and expanded, pottery and brick and tile were important products. However, as the population spread out into the prairies, the brick and tile phase of the industry soon outstripped the pottery segment of the industry, and for many years brick and tile manufacturing remained dominant.

During the early 1900's there was considerable demand over most of the state for common brick because of lack of stone of suitable quality and in sufficient quantity for building purposes. Drain tile, too, was in almost statewide demand because of the natural inadequacy of drainage over a large portion of the state. Fortunately, the need for common brick and draintile was well matched by the proximity of raw materials suitable for the manufacture of these products. The relation

Table 18. - Illinois Gravel Production by Regions, 1958[a,b]

Counties reporting[c]	Items	Gravel reported by uses			
		Road	Building	All Other	Total
		NORTHWEST			
Bureau					
Carroll					
Henry	Operations				36
Lee	Tons	749,789	736,063	126,039	1,611,891
Ogle	Value	$601,917	$731,043	$111,121	$1,444,081
Rock Island	Av. per ton	$.80	$.99	$.88	$.90
Stephenson					
Whiteside					
Winnebago					
		WEST			
Adams	Operations				8
Brown	Tons	227,592	-	166,971[d]	394,563
Fulton	Value	$268,465	-	$204,919	$473,384
Knox	Av. per ton	$1.18	-	$1.23	$1.20
		CENTRAL			
DeWitt					
Logan					
Macon	Operations				23
Marshall	Tons	2,541,507	588,147	254,732	3,384,386
McLean	Value	$2,372,107	$599,269	$231,401	$3,202,777
Peoria	Av. per ton	$.93	$1.02	$.91	$.95
Stark					
Tazewell					
Woodford					
		WEST SOUTHWEST			
	Operations				8
Bond	Tons	197,512	33,584	224,272	455,368
Pike	Value	$168,768	$40,216	$239,890	$448,874
Sangamon	Av. per ton	$.85	$1.20	$1.07	$.99
		SOUTHWEST			
	Operations				3
Alexander	Tons	-	-	7,153[e]	7,153
Clinton	Value	-	-	$7,041	$7,041
Jackson	Av. per ton	-	-	$.98	$.98

a Revised figures for 1958.
b All values at the pit.
c Refer to figure 8.
d Includes small amount of building gravel.
e Includes road, building and other gravel.

Table 18. - Continued[a,b]

Counties reporting[c]	Items	Gravel reported by uses: Road	Building	All Other	Total
		NORTHEAST			
Boone Cook DeKalb DuPage Kane Kendall Lake LaSalle McHenry Will	Operations				46
	Tons	6,881,081	2,435,565	541,853	9,858,499
	Value	$6,490,600	$2,384,356	$501,013	$9,375,969
	Av. per ton	$.94	$.98	$.92	$.95
		EAST			
Champaign Ford Vermilion	Operations				10
	Tons	123,903	83,447	32,900	240,250
	Value	$112,870	$64,142	$30,450	$207,462
	Av. per ton	$.91	$.77	$.93	$.86
		EAST SOUTHEAST			
Clark Coles Crawford Cumberland Fayette Lawrence	Operations				9
	Tons	233,067	74,190[d]	-	307,257
	Value	$147,534	$69,205	-	$216,739
	Av. per ton	$.63	$.93	-	$.71
		SOUTHEAST			
Hardin Wabash White	Operations				8
	Tons	276,919	35,850	6,321	319,090
	Value	$274,864	$37,474	$7,422	$319,760
	Av. per ton	$.99	$1.05	$1.17	$1.00
		STATE TOTALS			
Counties reporting					50
Operations reported					151
Tons		11,231,370	3,986,846	1,360,241	16,578,457
Value		$10,437,125	$3,925,705	$1,333,257	$15,696,087
Av. per ton		$.93	$.98	$.98	$.95

a Revised figures for 1958.
b All values at the pit.
c Refer to figure 8.
d Includes small amount of other gravel.

is particularly noteworthy in the case of draintile: glaciation is responsible for poor drainage conditions, but at the same time glacial deposits afford substantial quantities of clay for draintile to remedy the defect.

In 1918, 42 counties reported the production of draintile and 46 counties reported the production of common brick. However, a significant feature of the industry is the decline in the number of manufacturers of clay products from about 697 in 1894 to only about one-fourth that number in 1918. Today, there are fewer than 100 clay products manufacturers operating in the state. This change in the number of clay products manufacturers no doubt marks some of the economic changes that have taken place over the last half century. Rapid and efficient means of transportation has made building materials, other than brick, from near and far, more readily available. The relatively few clay products manufacturers operating today remain because they can demonstrate a high degree of manufacturing efficiency, or they have a unique market area, or they manufacture a unique product at a price customers are willing to pay.

Table 19. - Special Sands in Illinois, 1958-1959

Uses	1958*		1959[a]	
	Tons	Value	Tons	Value
Silica sand				
Molding sand	451,279	$1,225,581	473,800	$1,302,950
Other uses[b]	1,867,668	5,870,235	1,960,000	6,174,000
Ground silica[c]	194,163	2,253,681	203,900	2,446,800
Total silica sand	-	$9,349,497	-	$9,923,750
Natural bonded molding sand	30,708	71,490	27,500	63,250
Total special sands	-	$9,420,987	-	$9,987,000

* Revised figures.
a Estimated figures.
b Glass, grinding and polishing, blast, fire and furnace, engine, filter.
c For abrasives, ceramics, foundry and filler from ground siliceous material.

Table 20. - Production of Illinois Clay Products, 1958-1959

Clay products reported	1958*		1959[a]	
	Amount	Value	Amount	Value
Face brick	207,190,168	$8,862,094	241,589,980	$10,519,132
Common brick	226,276,206	5,845,580	256,322,463	7,340,204
Structural tile (tons)	48,874	494,870	35,079	372,224
Drain and sewer tile (tons)	157,762	3,582,316	160,977	4,135,277
Other structural products	-	1,711,259	-	1,375,152
Clay and silica refractories	-	10,861,608	-	11,197,877
Pottery and whiteware	-	23,918,273	-	23,346,077
Total		$55,276,000		$58,285,943

* Revised figures.
a Preliminary figures.

Table 21. - Illinois Counties and Clay Product Plants Reporting Production by Regions 1959[a,b]

County	Plants Reporting
NORTHWEST	
Bureau, Mercer, Rock Island	3
WEST	
Brown, Knox, McDonough, Warren	8
WEST SOUTHWEST	
Greene, Madison, Sangamon, Scott	7
SOUTHWEST	
St. Clair	2
CENTRAL	
Marshall, Menard, Tazewell	4
NORTHEAST	
Cook, Grundy, Kane, Lake, LaSalle, McHenry, Will	22
EAST	
Kankakee, Livingston, Vermilion	6
EAST SOUTHEAST	
Crawford, Fayette	2
SOUTHEAST	
Edwards	1

a Preliminary listing, subject to revision.
b Refer to figure 8.

According to the 1959 figures given in table 20 it is interesting to note that all structural clay products — face brick, common brick, structural tile, drain and sewer tile, and other structural products — amounted to about 41 percent of the total value of all clay products reported, clay and silica refractories amounted to 19 percent of the total value, and pottery and whiteware contributed 40 percent of the total 1959 value of clay products. Preliminary data in table 21 show that 55 clay products manufacturers in 28 counties reported production for the year 1959.

CEMENT

The manufacture of cement is the fifth largest mineral industry in value in Illinois, and two counties possess the state's four cement manufacturing plants; two are located at Oglesby and one at LaSalle in LaSalle County, and one at Dixon in Lee County. Figures in table 1 indicate that Illinois shipped a total of more than 9.6 million barrels of all types of cement in 1958, valued at a total of more than 30.8 million dollars. Preliminary figures for 1959 show that Illinois cement manufacturers increased their shipments over 1958 by a small amount to approximately 9.9 million barrels, valued at 31.7 million dollars.

The manufacture of cement is a large-scale operation involving a heavy investment in plant and quarry, and the industry is highly competitive in many localities where there are a number of mills within shipping radius. The success of a plant depends upon the market outlet obtainable for its product when it is operating near capacity, and upon low cost transportation to a large market in its vicinity. The Illinois cement industry, located as it is in the north central part of the state, is near a tremendous market area and has available both rail and water transportation systems.

Cement is made today by crushing and grinding to a fine powder a mixture of limestone and clay or shale plus relatively small amounts of other materials, usually some form of iron oxide, and heating the mixture until certain chemical interactions have taken place. However, at Utica, on the Illinois River, early settlers discovered abundant supplies of natural cement materials — a position more strategic than this could not be imagined for such a resource. In the pre-railroad days the Illinois River furnished a ready line of transportation for the material to the population centers west and south of Utica. Later, with the building of the Illinois and Michigan Canal, in the construction of which Utica natural cement played an extensive part, an easy way was opened to the markets in growing Chicago. Still later, when the railroads focused on the LaSalle-Utica area, markets of the prairies were opened for the Utica natural cement.

Natural cement from Illinois sources was shipped widely in the past, but in spite of the excellence of the Utica product, the standardization possible in manufactured cement, and with cement raw materials more widely available, the production of the manufactured product has replaced the natural product.

FLUORSPAR

Fluorspar is an important raw material for the iron and steel, aluminum, chemical, glass, and ceramics industries. Commercial fluorspar is graded principally according to its content of calcium fluoride and is ordinarily prepared as metallurgical grade, acid grade, and ceramic grade.

The mineral fluorspar is about as hard as glass, fairly heavy, and brittle. It is transparent or translucent and commonly ranges in color from green to white, but also occurs in yellow, blue, purple, pink, and brown hues. Crystallization usually takes the form of cubes.

In 1842, lead associated with fluorspar in vein formation was discovered in Hardin County, Illinois, near the site of present day mining activity. From that time to about 1870, this first discovered vein, and similar veins in that district, were mined chiefly for their lead content. However, as various industries began to demand fluorspar in increasing amounts, lead production became a side issue in the main business of fluorspar mining.

Until 1896 the only production of this mineral in the United States was from the deposits of Hardin County, which have been known throughout the world as among the best ever discovered. In 1896 mines were opened in the adjacent Kentucky district, and for several years Illinois production slumped. About 1902 a strong revival in production began, and since that time Illinois has been a dominant factor in fluorspar production.

Table 22. - Fluorspar Shipped from Mines in the United States and Imports in 1958[a]

State	1958		Percent of United States	
	Tons	Value	Total tons	Total value
Illinois	152,087	$ 7,930,613	47.6	52.6
Kentucky	25,861	1,201,408	8.1	8.0
Utah	16,109	563,726	5.0	3.7
Other states	125,456	5,375,642	39.3	35.7
Total 1958	319,513	$15,071,389	100.0	100.0
Total 1957	328,872	$15,776,888		
Imports for use in the United States				
Total 1958	392,164	$ 9,776,957		
Total 1957	631,367	$16,031,085		

a Source: U. S. Bureau of Mines.

Table 23. - Fluorspar (Domestic and Foreign) Consumed in the United States, 1957-1958[a]

State	Tons consumed		Percent of 1958 total consumed
	1957	1958	
Delaware and New Jersey	79,275	120,944	24.5
Illinois	97,454	62,974	12.7
Ohio	72,151	58,360	11.8
Pennsylvania	82,882	55,164	11.1
Kentucky	30,111	29,197	5.9
Arkansas, Kansas, Louisiana, Oklahoma	88,622	29,096	5.9
Indiana	33,451	25,307	5.1
Colorado and Utah	22,944	17,607	3.6
Texas	21,221	15,848	3.2
Michigan	20,453	14,594	3.0
New York	20,204	13,832	2.8
California	35,985	12,621	2.6
All other states	39,935	38,683	7.8
Total	644,688	494,227	100.0

a Source: U. S. Bureau of Mines.

Uses

During recent years the increased use of acid grade fluorspar by the aluminum and chemical industries for the manufacture of hydrofluoric acid has put this use of fluorspar in first place. During 1959, according to a report by the U. S. Bureau of Mines, domestic shipments of acid grade fluorspar amounted to about 116,700 tons. In the aluminum industry hydrofluoric acid is produced and used almost entirely in the manufacture of aluminum fluoride and synthetic cryolite, both needed in the manufacture of aluminum. The hydrofluoric acid produced in the chemical industry is used primarily as an intermediate in the manufacture of fluorine compounds. These compounds are used for the manufacture of such things as insecticides, wood preservatives, welding fluxes, antiseptics, tooth decay preventives, synthetic optical crystals, and for many other purposes.

The second most important consumer of fluorspar, the steel industry, uses it as a flux in the production of basic open-hearth steel, electric furnace steel, ferro-alloys, and alloy steel and Bessemer steel; it is also used in iron foundaries. The addition of fluorspar to the molten metal increases the fluidity of the slag and helps remove impurities. The U. S. Bureau of Mines reports that during 1959 domestic shipments of metallurgical grade fluorspar amounted to about 34,350 tons.

Uses for ceramic grade fluorspar include the manufacture of opal, opaque and colored glass, and enamels for coating metal, metalware, and ceramic tiles. It is also used in the production of portland cement, rock wool, artificial abrasives, and basic refractory cements and bricks. In 1959 shipments of ceramic grade fluorspar amounted to about 26,900 tons, according to a U. S. Bureau of Mines report.

Production

Domestic production of finished fluorspar in 1959 totaled 181,600 tons and shipments of some 177,900 tons were valued at more than $8,462,000, according to reports of producers to the U. S. Bureau of Mines. In 1958 finished fluorspar production totaled 310,600 tons and shipments of 319,500 tons were valued at about $15,071,000. Imports for consumption in 1959 totaled nearly 555,800 tons; during 1958 about 392,200 tons were imported for consumption. Fluorspar consumed in the United States in 1959 totaled 589,100 tons compared to 494,200 tons in 1958.

Table 22, which indicates the amount of fluorspar shipped from mines in the United States in 1958, shows that Illinois was the foremost producer of this mineral in the country. Table 23, which lists the several states that consume fluorspar, shows that Illinois is also a leading consumer of the mineral.

METALS IN ILLINOIS

The date of the earliest use of the lead deposits of the upper Mississippi region (in the area now known as Jo Daviess County) is unknown, but from the evidence of crude mining tools found in abandoned drifts by the earliest white miners, it is believed that the Indians had used lead even prior to the advent of the French explorers. Hennepin's map, dated 1687, shows native mines near the site of Galena. During the eighteenth century, Indians did most of the mining and sold their crudely processed lead product to traders. In 1815 about 20 furnaces are said to have been operated by the Indians near the present site of Galena, but the first mining by white men at this point probably took place about 1821 to 1824 and was confined to prospects formerly worked by the Indians.

Much friction over trading rights between the French and the Indians on one hand and the English (and later the Americans) on the other, kept the lead region in continual turmoil during the eighteenth and early part of the nineteenth century. Under such circumstances mining was not particularly active or systematic. However, in 1816 the Indians ceded to the government for mining an area of some 15 square miles on the Fever River (now called the Galena River), and in 1823 the first systematic mining was undertaken by experienced miners using adequate tools. By 1836 the mining operations were so general that Galena had become a thriving mining town, and railroads running west out of Chicago and up the Mississippi made Galena a point of call.

About 1850 lead production declined abruptly — causes for the decline are attributed to circumstances as follows: (1) The richer deposits began to give out; (2) by 1850 the shallower diggings were largely exhausted; (3) gold discovery in California lured many miners from the district; (4) as mining reached greater depths, the zinc ores increased in abundance. Other reasons of lesser importance also contributed to the decline of lead production at that time.

Previous to 1850 the zinc ores had no commercial value and when encountered were thrown away. However, as lead production declined, zinc began to come into prominence because satisfactory smelters had been developed. Between 1850 and 1870 three large smelters, one at LaSalle, a second at Mineral Point, Wisconsin, and a third at Peru, Illinois, were built to smelt upper Mississippi Valley zinc. After this the production of zinc increased rapidly and that of lead declined.

Table 24. - Illinois Zinc, Lead, and Silver Production, 1940-1959[a]

Year[b]	Zinc		Lead		Silver	
	Tons	Value	Tons	Value	Ounces	Value
1940	4,818	$ 607,068	1,508	$ 150,800	4,766	$ 3,389
1941	9,198	1,379,700	2,376	270,864	20,340	14,464
1942	9,389	1,746,354	2,344	314,096	104	74
1943	5,851	1,263,816	2,043	306,450	2,153	1,531
1944	7,262	1,655,736	1,971	315,360	2,437	1,733
1945	8,310	1,911,300	3,005	516,860	2,198	1,563
1946	8,798	2,146,712	3,865	842,570	2,302	1,860
1947	10,073	2,437,666	2,325	669,600	1,790	1,620
1948	12,980	3,452,680	3,695	1,322,810	4,047	3,663
1949	18,157	4,502,936	3,824	1,208,384	3,128	2,831
1950	26,982	7,500,996	2,729	725,914	2,001	1,811
1951	21,776	7,926,464	3,160	1,093,360	3,465	3,136
1952	18,816	6,246,912	4,262	1,372,364	3,781	3,422
1953	14,556	3,347,880	3,391	888,442	2,338	2,116
1954	14,427	3,116,232	3,232	885,568	1,160	1,050
1955	21,700	5,338,200	4,544	1,354,112	3,075	2,783
1956	24,039	6,586,686	3,832	1,203,248	1,580	1,430
1957	22,185	5,146,920	2,970	849,420	-	-
1958*	24,940	5,087,760	1,610	376,740	-	-
1959[c]	25,275	5,762,700	2,125	505,750	-	-

* Revised figures.
a Mine production of recoverable metal.
b Source: U. S. Bureau of Mines.
c Preliminary figures.

Today lead and zinc are still produced as primary products from mines in northern Illinois and as by-products of fluorspar mining in southern Illinois. Table 24 gives for the state of Illinois a production history of zinc, lead, and silver for the years 1940-1959.

The directory of Illinois industrial mineral producers, previously published in the annual mineral production reports, is not included in this report. It is planned that such a directory will be issued as a separate publication at the earliest possible date.

Illinois State Geological Survey Circular 300
36 p., 8 figs., 24 tables, 1960

CIRCULAR 300

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