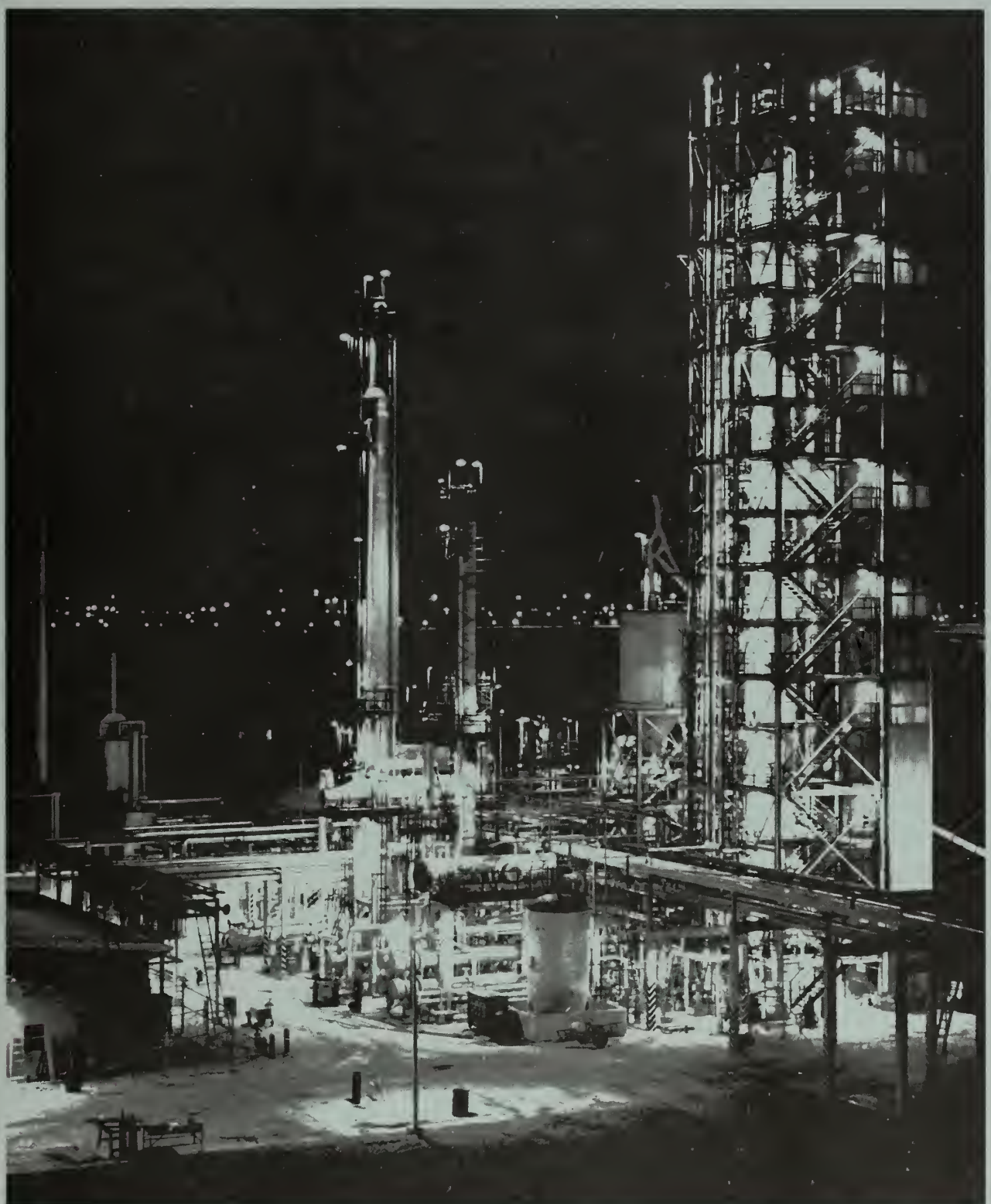
Illinois Mineral Industry in 1977

and review of preliminary mineral production data for 1978

Irma Samson



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COVER PHOTO This HYGAS pilot plant in Chicago is designed to convert coal to a clean burning natural gas equivalent. The HYGAS process was developed by the Institute of Gas Technology (IGT) under joint sponsorship of the U.S. Department of the Interior's Office of Coal Research and the American Gas Association.
Photo courtesy of IGT, Chicago.

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ABSTRACT

This annual report of mineral production in Illinois in 1977 summarizes output and value of minerals mined, minerals processed, and mineral products manufactured but not necessarily mined in Illinois. The total value of production in all three categories in 1977 was $3,094.1 million. The total value of mineral materials mined was $1,512.2 million, with the mineral fuels–coal, crude oil, and natural gas–contributing 82.4 percent of the total value. Processed mineral materials were valued at $1,249.5 million, and mineral products manufactured totaled $332.4 million in 1977. Coal was the leading mineral commodity in terms of value; oil ranked second; stone and sand and gravel, used largely for construction, ranked third and fourth; and fluorspar was fifth. None of these five major commodities showed an increase in tonnage; the increase in value reported was due to higher commodity prices. Illinois remained the leading U.S. producer of fluorspar and tripoli, ranked second in stone, third in peat, fourth in bituminous coal and fifth in sand and gravel.

Preliminary data indicate that the value of mineral materials mined in 1978 rose to $1,593.1 million from $1,512.2 million in 1977.

Detailed production summaries and analyses–including maps, tables, and graphs–are given for all mineral commodities.

AN OVERVIEW

The mineral industry in Illinois includes three types of operations: the actual removal of mineral materials from the ground by mining or other means of extraction; the processing of crude mineral materials (mined primarily outside Illinois) into basic industrial raw materials; and the manufacture of mineral products such as coke, lime, and cement from mineral materials extracted and processed primarily in Illinois (fig. 1). Table 1 gives present data on the production and value of commodities in all three categories from 1975 through 1977.

The total value from the three types of operations in 1977 was $3,094.1 million, an increase of 4.5 percent over 1976. The true value is actually higher than this figure indicates, since the figure does not include the values of some commodities for which specific information is unavailable (indicated on table 1 by the symbol "NA"). In 1977 Illinois was the leading producer of fluorspar and tripoli, ranked second in stone production, fourth in bituminous coal, third in peat, and fifth in sand and gravel according to information for the U.S. Bureau of Mines. Table 2 gives 1977 data on Illinois mineral production and its percentage of the total national output.

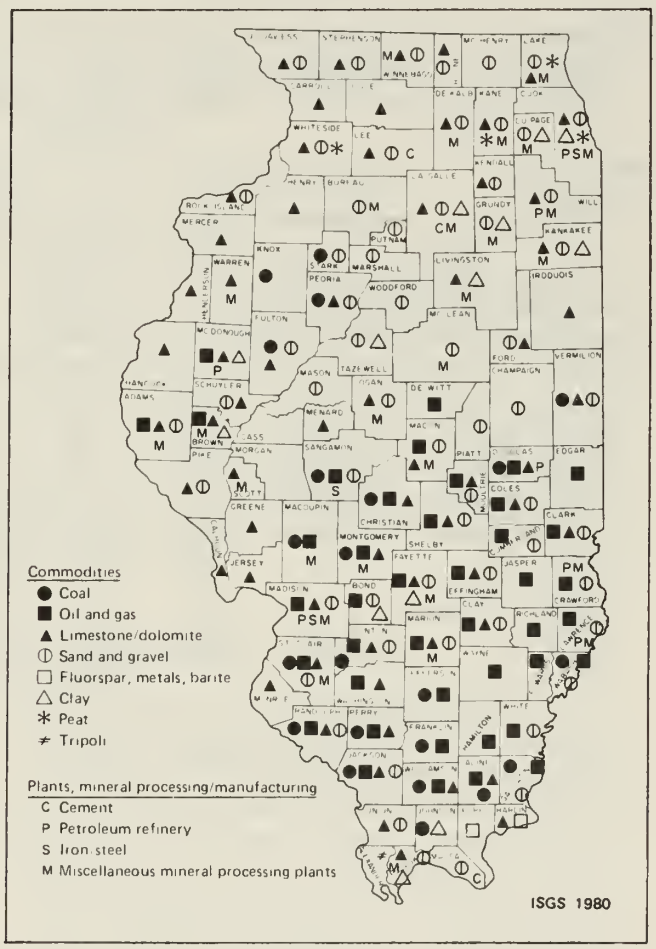

Figure 1. Illinois mineral prduction and mineral processing plants, by county, 1977.

TABLE 1—PRODUCTION AND VALUE OF MINERAL MATERIALS MINED AND/OR PROCESSED AND MINERAL PRODUCTS MANUFACTURED

Commodity	Unit	1977 Quantity	1977 Value ($1000)	1977 Average unit value ($)	1976 Quantity	1976 Value ($1000)	1976 Average unit value ($)	1975 Quantity	1975 Value ($1000)	1975 Average unit value ($)
MINERAL MATERIALS MINED										
FUELS										
Coal	thousand tons	53,880	$ 931,054	$ 17.28	58,136	$ 924,365	$ 15.90	59,539	$ 871,651	$ 14.64
Crude oil	thousand bbl	25,608	314,293	12.27	26,272	267,450	10.18	26,067	273,179	10.48
Natural gas	thousand Mcf	1,003	1,204	1.20	1,556	1,533	0.985	1,440	1,008	0.70
Natural gas liquids[a]	million bbl	NA[b]	NA	NA	NA[b]	NA	NA	NA[b]	NA	NA
TOTAL[c]			$1,246,550			$1,193,348			$1,145,837	
INDUSTRIAL AND CONSTRUCTION MATERIALS										
Clays										
Common	thousand tons	914	4,790	5.24	1,258	2,890	2.30	1,310	2,856	2.18
Refractory	thousand tons	37	327	8.84	51	382	7.50	57	393	6.94
Absorbent	thousand tons	W[d]	W	44.60	W[d]	W	45.70	W[d]	W	W
Fluorspar (shipments)	tons	131,218	13,941		142,666	14,563	101.37	99,898	8,957	89.66
Sand and gravel										
Common	thousand tons	33,286	68,353	2.05	34,299	61,759	1.80	34,600	59,964	1.73
Industrial	thousand tons	4,327	32,877	7.38	4,485	25,393	5.66	4,400	23,551	5.35
Stone (limestone and dolomite)										
Crushed and broken	thousand tons	57,074	135,964	2.38	61,858	141,441	2.29	60,637	130,025	2.14
Dimension	tons	2,545	109	42.79	4,108	103	25.14	W	W	W
Tripoli	thousand tons	W[d]	W	W	W	W	W	W	W	W
TOTAL[c]			256,361			246,531			225,746	
METALS										
Lead	tons	W[d]	W	W	W[d]	W	W	1,068	459	429.78
Zinc	tons	W[d]	W	W	W[d]	W	W	W[d]	W	W
Silver	troy ounces	W[d]	W	W	W[d]	W	W	W[d]	W	W
Germanium		NA[b]	NA	NA	NA[b]	NA	NA	NA[b]	NA	NA
TOTAL[c]			W[d]			W[d]			459	
OTHERS										
Peat (sold)	thousand tons	82	1,478	17.94	87	763	8.76	96	1,511	15.79
Gem stones		NA	2	NA	NA	2	NA	NA	2	NA
Barite, primary	thousand tons	W	W	W	W	W	W	W	W	W
TOTAL[c]			1,480			765			1,513	
Values that cannot be disclosed (W)			7,778			10,353			9,886	
Total value of mineral materials mined[c]			1,512,170			1,450,997			1,383,441	
MINERAL MATERIALS PROCESSED										
Natural gas liquids	thousand bbl	W	W	W	W	W	W	W	W	W
Mica, ground										
Perlite, expanded	short tons	W	W	W	W	W	W	W	W	W
Barite, ground	short tons	W	W	W	W	2,345	W	W	W	W
Gypsum, calcined	short tons	W	W	W	W	W	W	W	W	W
Vermiculite, exfoliated	short tons	W	W	W	W	W	W	W	W	W
Iron oxide pigments	short tons	39,253	18,123	461.70	42,667	19,258	451.36	W	W	W
Bismuth		NA	NA	NA	NA	NA	NA	NA	NA	NA
Primary slab zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA
Secondary slab zinc		NA	NA	NA	NA	NA	NA	NA	NA	NA
Columbium and tantalum		NA	NA	NA	NA	NA	NA	NA	NA	NA
Iodine, crude	pounds	W	W	W	W	W	W	W	W	W
Pig iron	thousand tons	6,226	1,155,931	185.66	6,429	1,119,757	174.17	5,218	905,531	173.73
TOTAL[c]			1,174,054			1,141,360			905,531	
Values that cannot be disclosed (W)			75,453			54,510			26,781	
Total value of mineral materials processed			1,249,507			1,195,870			932,312	

TABLE 1—continued

Commodity	Unit	1977 Quantity	1977 Value ($1000)	1977 Average unit value ($)	1976 Quantity	1976 Value ($1000)	1976 Average unit value ($)	1975 Quantity	1975 Value ($1000)	1975 Average unit value ($)
MINERAL PRODUCTS MANUFACTURED										
Cement (shipments)										
Portland	thousand tons	1,823	61,849	33.92	1,632	53,524	32.80	1,374	42,756	31.12
Masonry	thousand tons	W	W	W	74	4,356	58.57	69	3,658	53.01
Clay products, estimated			58,385			57,986		—	49,730	—
Lime	thousand tons	W	W	W	W	W	W	W	W	W
Sulfur[e]	long tons	W	W	W	W	W	W	W	W	W
Coke	thousand tons	1,591	164,303	103.27	1,706	160,961	94.35	1,924	168,619	87.64
Glass		NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL[c]			284,537			276,827			264,763	
Values that cannot be disclosed (W)			47,877			37,725			31,362	
Total value of mineral products manufactured			332,414			314,552			296,125	
STATE TOTAL[c]			$3,094,091			$2,961,419			$2,611,877	

[a]Produced in Illinois, according to the American Petroleum Institute.
[b]NA=not available.
[c]Data may not add to totals shown due to independent rounding.
[d]W=withheld to avoid disclosing individual company confidential data.
[e]Values and amounts of sulfur processed are included with total of mineral products manufactured to avoid disclosing individual company confidential data on lime.
Source: U.S. Bureau of Mines, Illinois Department of Mines and Minerals, Illinois State Geological Survey.

Mineral materials mined

The 1977 value of commodities mined in Illinois was $1,512.2 million, showing a 4.2 percent increase over the previous record high of $1,451.0 million in 1976 (table 1). The mineral fuels—coal, crude oil and natural gas—accounted for 82.4 percent of the 1977 total; industrial and construction materials—clays, fluorspar, sand and gravel, stone, and tripoli—added 17.2 percent; the metals—lead, zinc, silver—along with other minerals such as peat, barite, and gemstones, made up the remaining 0.3 percent.

Extraction of mineral materials was reported by 99 of the state's 102 counties (table 3). Perry County ranked first in terms of production value, producing coal, crude oil and stone at a total value of $165.5 million (approximately 5.3 percent of the state total). Randolph County ranked second with a total value of $123.7 million from coal, stone, crude oil, and sand and gravel.

Mineral materials processed

In 1977 seventeen Illinois counties processed raw mineral materials, which came primarily from other states (table 3). Minerals processed (total value, $1,249.5 million) included pig iron, natural gas liquids, expanded perlite, sulfur, ground barite, calcined gypsum, exfoliated vermiculite, iron oxide pigments, crude iodine, bismuth, columbium, and tantalum, and both primary and secondary slab zinc. Pig iron produced in Cook and Madison Counties accounted for 92.5 percent of this total. The total does not include the value of elemental sulfur recovered; this value is included with mineral products manufactured to avoid disclosing confidential data from individual companies.

Illinois again led the nation in 1977 in production of expanded perlite and ranked second in output of iron oxide pigments.

Mineral products manufactured

Mineral products manufactured in Illinois (primarily from materials mined within the state) included coke, clay products, cement, lime, and glass. In 1977 the combined value of these products—plus sulfur processed, as explained previously, was $33.24 million, an increase of 5.7 percent over the $314.6 million reported in 1976 (table 1). Coke accounted for 49.4 percent of the total value, portland cement for 18.6 percent, and clay products for 17.6 percent. No figures were available for the value of glass manufactured in Illinois.

Employment and wages

Illinois Department of Labor data indicated that the Illinois mineral industry employed 147,100 persons in 1977, including 23,400 in mining, quarrying, and oil and gas extraction—a 9.3 percent decrease from 1976; 71,300 in mineral processing—a 5.3 percent decrease from the previous year; and 52,400 in manufacturing mineral products—a 7.8 percent increase over 1976 (table 4).

The average weekly earning of workers in the mining sector of the Illinois mineral industry was $369.29, an increase of 18.2 percent over the average earning in 1976. The average weekly earning of bituminous coal miners was $406.50, the highest in the mineral industries.

TABLE 2—ILLINOIS MINERAL PRODUCTION, ITS VALUE AND PERCENTAGE OF UNITED STATES MINERAL PRODUCTION, 1977

Commodity	Unit	Illinois		United States		Illinois percentage of United States Production	
		Quantity	Value ($1000)	Quantity	Value ($1000)	Quantity	Value
Fluorspar shipments	thousand tons	131	13,941	170	16,479	77.06	84.60
Peat, commercial sales	thousand tons	82	1,478	818	13,019	10.02	11.35
Coal	thousand tons	53,880	931,054	691,344	11,946,424	7.79	7.79
Pig Iron	thousand tons	6,226	1,155,931	80,991	NA	7.72	—
Stone	thousand tons	57,074	135,964	955,370	2,456,900	5.97	5.53
Sand and gravel	thousand tons	37,633	101,230	929,200	2,028,000	4.05	4.99
Coke	thousand tons	1,591	164,303	53,509	5,535,677	2.97	2.97
Clays[b]	thousand tons	950[b]	5,118[b]	53,395	578,549	1.78	0.88
Zinc	thousand tons	W	W	458	NA	—	—
Cement shipments	thousand tons	1,823	61,849	80,247	2,932,403	2.27	2.11
Crude oil	thousand bbl	25,608	314,293	3,009,265	25,790,722	0.85	1.22
Lead	thousand tons	W	W	537	NA	—	—
Natural gas liquids	thousand bbl	NA	NA	590,455	NA	—	—
Natural gas	million cu ft	1,003	1,204	20,025,463	15,833,719	0.01	0.01
Lime	thousand tons	W	W	19,987	669,565	—	—

[a] NA=not available.
[b] Excluding fuller's earth.
[c] W=withheld to avoid disclosing confidential data from individual companies.

Source: U.S. Bureau of Mines, Illinois State Geological Survey, Illinois Department of Mines and Minerals, and American Petroleum Institute.

Transportation of mineral materials

A considerable part of the Illinois transportation industry is based on the shipment of mineral materials. In 1977 about 84 million tons of mineral materials were shipped by truck, and more than 47 million tons of million tons by railroad. Crushed stone accounted for approximately 62.3 percent of the total tonnage shipped by truck, and sand and gravel for about 26.9 percent. Coal comprised about 90 percent of the railroad tonnage. Other materials, such as pig iron, fluorspar, coke, and clay products, were shipped by railroad, truck, and barge. Crude oil and natural gas were transported by pipeline, and minor amounts of coal were moved to mine-mouth generating plants by conveyor belt in Christian and Montgomery Counties.

Mineral and energy consumption

Each year Illinois, as a leading manufacturing state, consumes a large variety of mineral materials. Data for some of the mineral materials used in Illinois during 1976 and 1977 are given in table 5.

Illinois consumption of mineral commodities is, on the average, about 5.5 percent of the total consumption of mineral commodities in the nation, approximately proportionate to Illinois' share of the total population of the United States.

In 1977 Illinois consumed an estimated 3,644.5 trillion Btu of energy, or 5.17 percent of the total energy consumed in the United States (table 6). A large part—91.6 percent—came from fossil fuels. In 1976, Illinois energy consumption was estimated at 3,687.9 trillion Btu, or 5.36 percent of the U.S. total. Illinois consumed approximately 1 percent less energy in 1977 than in 1976.

Trends in total energy used in Illinois are shown in figure 2. In 1977 there was a slight decrease in total energy consumption in Illinois from 1976; however, the overall consumption has been increasing steadily, from 2,215 trillion Btu in 1957 to 3,644.5 trillion Btu in 1977. The use of coal as a source of energy has been declining while the use of natural gas and oil products has been increasing except for a 1.7 percent drop in natural gas in 1977. Coal accounted for only 23.1 percent of Illinois' 1977 energy consumption, as compared to 24.8 percent in 1976. The use of nuclear power has been increasing rapidly since 1969, partly replacing coal in the Illinois market. Nuclear power accounted for 8.4 percent of Illinois' 1977 energy consumption.

TABLE 3—VALUE OF MINERAL MATERIALS MINED AND/OR PROCESSED AND MINERAL PRODUCTS MANUFACTURED IN ILLINOIS, 1977, BY COUNTY

County	Approximate[a] rank based on total value	Mineral materials mined, in order of value	Value ($1000)	Mineral materials processed, in order of value	Value ($1000)	Mineral products manufactured, in order of value	Value ($1000)	Total value ($1000)
Adams	40	Stone; sand & gravel; crude oil	W	Iron oxide pigments	430	—	—	W
Alexander	88	Tripoli	W	—	—	—	—	W
Bond	72	Crude oil; natural gas; clay; sand & gravel	1,309	—	—	—	—	1,309
Boone	79	Stone; sand & gravel	W	—	—	—	—	W
Brown	90	Stone; crude oil; clay	W	—	—	Clay products	W	468
Bureau	81	Sand & gravel	777	—	—	Clay products	W	W
Calhoun	95	Stone	W	—	—	—	—	W
Carroll	91	Stone	410	—	—	—	—	410
Cass	101	—	—	—	—	—	—	—
Champaign	74	Sand & gravel	1,203	—	—	—	—	1,203
Christian	33	Coal; crude oil; stone	13,477	—	—	—	—	13,477
Clark	41	Stone; crude oil[c]; sand & gravel	7,578	—	—	—	—	7,578
Clay	32	Crude oil; stone; sand & gravel	W	—	—	—	—	W
Clinton	42	Crude oil; stone; sand & gravel; coal	W	—	—	—	—	W
Coles	49	Crude oil; stone; natural gas; sand & gravel	W	—	—	—	—	W
Cook	6	Stone; sand & gravel; clay; peat	W	Pig iron[d]; expanded perlite; sulfur[e]; secondary slab zinc[f]; bismuth[f]	W	Coke[d]; lime; clay products	49,388	86,408
Crawford	27	Crude oil; sand & gravel	W	Sulfur[e]	e	—	W	W
Cumberland	93	Crude oil[c]; sand & gravel	W	—	—	—	—	W
De Kalb	58	Stone; sand & gravel	W	Exfoliated vermiculite; expanded perlite	W	—	—	2,648
De Witt	70	Crude oil	1,374	—	—	—	—	1,374
Douglas	3	Coal; stone; crude oil	47,955	Natural gas liquids	W	—	—	W
Du Page	34	Sand & gravel; stone	W	Exfoliated vermiculite	W	Clay products; glass[f]	W	11,613
Edgar	80	Crude oil	896	—	—	—	—	896
Edwards	45	Crude oil	6,123	—	—	—	—	6,123
Effingham	51	Crude oil; sand & gravel; stone	W	—	—	—	—	W
Fayette	23	Crude oil; stone; clay; sand & gravel	W	Sulfur[e]	e	Clay products	W	25,490
Ford	73	Sand & gravel; stone	W	—	—	—	—	W
Franklin	5	Coal; crude oil	87,602	—	—	—	—	87,602
Fulton	12	Coal; sand & gravel; stone	48,428	—	—	—	—	48,428
Gallatin	17	Coal; crude oil; sand & gravel; natural gas	W	—	—	—	—	W
Greene	54	Stone	W	—	—	—	—	W
Grundy	53	Sand & gravel; clay	W	—	—	Clay products	W	W
Hamilton	47	Crude oil	5,742	—	—	—	—	5,742
Hancock	82	Stone	761	—	—	—	—	761
Hardin	29	Fluorspar; stone; zinc; primary barite; lead; silver; gemstones; germanium[f]	21,693	—	—	—	—	21,693
Henderson	75	Stone	1,043	—	—	—	—	1,043
Henry	87	Stone	W	—	—	—	—	W
Iroquois	100	Stone	W	—	—	—	—	W
Jackson	22	Coal; stone; crude oil; sand & gravel	W	—	—	—	—	W
Jasper	43	Crude oil	6,466	—	—	—	—	6,466
Jefferson	4	Coal; crude oil	89,988	—	—	—	—	89,988
Jersey	94	Stone	W	—	—	—	—	W
Jo Daviess	77	Sand & gravel; stone	W	—	—	—	—	W
Johnson	62	Stone; coal	W	—	—	—	—	W
Kane	26	Sand & gravel; stone[g]; peat	12,153	Iron oxide pigments	W	Clay products	W	W
Kankakee	50	Stone; clay; sand & gravel	W	Sulfur[e]	e	—	W	5,313
Kendall	84	Stone; sand & gravel	W	—	—	—	—	W
Knox	28	Coal	19,905	—	—	—	—	19,905
Lake	35	Sand & gravel; peat; stone	W	Calcined gypsum; expanded perlite; crude iodine; columbium[f]	W	Clay products; glass[e]; fiberglass[e]	W	11,502
LaSalle	7	Sand & gravel; stone; clay	41,402	—	—	Portland cement; clay products; glass[e]	W	W

TABLE 3—continued

County	Approximate[a] rank based on total value	Mineral materials mined, in order of value	Value ($1000)	Mineral materials processed, in order of value	Value ($1000)	Mineral products manufactured, in order of value	Value ($1000)	Total value ($1000)
Lawrence	15	Crude oil; sand & gravel	39,031	Sulfur[e]	e	—	W	W
Lee	25	Stone; sand & gravel	2,535	—	—	Portland cement; masonry cement	W	W
Livingston	37	Stone; clay	8,730	—	—	Clay products	W	W
Logan	64	Sand & gravel; stone	W	—	—	Glass	f	W
McDonough	71	Stone; crude oil; clay	W	—	—	—	—	W
McHenry	31	Sand & gravel	14,049	—	—	—	—	14,049
McLean	65	Sand & gravel	2,101	—	—	Fiberglass	f	2,101
Macon	68	Sand & gravel; crude oil; stone	1,759	—	—	Glass	f	1,759
Macoupin	9	Coal; crude oil	62,666	Exfoliated vermiculite	W	—	—	W
Madison	38	Stone; crude oil; sand & gravel	5,060	Pig iron[d]; sulfur[e]	d,e	Coke[d]; clay products; glass[f]	W	W
Marion	19	Crude oil; stone; sand & gravel	W	Secondary slab zinc	f	Glass	f	W
Marshall	89	Sand & gravel	W	—	—	—	—	W
Mason	98	Sand & gravel	W	—	—	—	—	W
Massac	24	Sand & gravel	W	—	—	Portland cement; masonry cement	W	24,392
Menard	69	Stone	W	—	—	—	—	W
Mercer	99	Stone	26	—	—	—	—	26
Monroe	78	Stone; crude oil	W	—	—	—	—	W
Montgomery	11	Coal; stone; crude oil	48,768	—	—	Glass	f	48,768
Morgan	102	—	—	—	—	—	—	—
Moultrie	97	Crude oil; sand & gravel	W	—	—	—	—	W
Ogle	66	Stone	1,963	—	—	—	—	1,963
Peoria	30	Coal; stone; sand & gravel	18,134	—	—	—	—	18,134
Perry	1	Coal; crude oil; stone	165,454	—	—	—	—	165,454
Piatt	92	Sand & gravel	W	—	—	—	—	W
Pike	76	Stone; sand & gravel	W	—	—	—	—	W
Pope	56	Fluorspar[h]; lead[h]; zinc[h]; silver[h]	g	—	—	—	—	g
Pulaski	39	Clay; stone; sand & gravel	W	—	—	Clay products	3,202	W
Putnam	96	Sand & gravel	W	—	—	—	—	W
Randolph	2	Coal; stone; crude oil; sand & gravel	123,725	—	—	—	—	123,725
Richland	36	Crude oil	10,896	—	—	—	—	10,896
Rock Island	55	Stone; sand & gravel	W	—	—	—	—	W
St. Clair	8	Coal; stone; crude oil; sand & gravel	W	Iron oxide pigments; primary slab zinc; ground barite	W	Glass	f	65,511
Saline	18	Coal; crude oil; natural gas	33,283	—	—	—	—	33,283
Sangamon	20	Coal; sand & gravel; crude oil	31,512	Iron oxide pigments	299	—	—	31,811
Schuyler	86	Sand & gravel; stone	W	—	—	—	—	W
Scott	63	Stone	W	—	—	Clay products	W	W
Shelby	85	Crude oil; sand & gravel; stone	W	—	—	—	—	W
Stark	67	Coal; sand & gravel	W	—	—	—	—	W
Stephenson	83	Stone; sand & gravel	683	—	—	—	—	683
Tazewell	59	Sand & gravel; clay	2,615	—	—	—	—	2,615
Union	57	Stone; sand & gravel	W	—	—	—	—	W
Vermilion	48	Stone; coal; sand & gravel	W	—	—	—	—	W
Wabash	14	Coal; crude oil; sand & gravel	41,293	—	—	—	—	41,293
Warren	46	Stone	1,683	—	—	Clay products	W	W
Washington	44	Crude oil; stone	W	—	—	—	—	W
Wayne	13	Crude oil	46,184	—	—	—	—	46,184
White	16	Crude oil; sand & gravel	36,806	—	—	—	—	36,806
Whiteside	61	Stone; peat; sand & gravel	W	—	—	—	—	W
Will	21	Stone; sand & gravel	14,362	Expanded perlite; sulfur[d]; crude iodine	W	Clay products; glass[f]	W	29,897
Williamson	10	Coal; crude oil; natural gas; stone	49,066	—	—	—	—	49,066
Winnebago	52	Stone; sand & gravel	3,178	—	—	Clay products	W	W
Woodford	60	Sand & gravel	2,566	—	—	—	—	—
Undistributed		Crude oil; stone	8,505	Pig iron	1,155,931	Coke	164,303	1,328,739
Values that cannot be disclosed (W)			319,256		92,848		116,337	556,934
Total[i]			1,512,170		1,249,507		332,414	3,094,091

[a]Since some values are not available by county, county ranking cannot be exact.

[b]W = withheld to avoid disclosing confidential data from individual companies.

[c]Crude oil value included with Cumberland County.

[d]Pig iron and coke not available by county.

[e]Sulfur values included with mineral products manufactured to avoid disclosing individual companies' confidential data on lime.

[f]Value unknown; not included in total.

[g]Including dimension stone.

[h]Fluorspar and metals values included with Hardin County.

[i]Data may not add to totals shown because figures have been rounded.

Source: U.S. Bureau of Mines, Illinois Department of Mines and Minerals, and Illinois State Geological Survey.

TABLE 4—NUMBER OF EMPLOYEES AND AVERAGE WEEKLY EARNINGS, HOURS WORKED, AND HOURLY WAGES IN ILLINOIS MINERAL INDUSTRY, 1976 AND 1977

Class of employment	1977				1976			
	Number of employees (x 1000)	Average weekly earnings ($)	Average number of hours worked per week	Average hourly earnings ($)	Number of employees (x 1000)	Average weekly earnings ($)	Average number of hours worked per week	Average hourly earnings ($)
Mining	23.4	369.29	46.5	7.94	25.8	312.52	42.1	7.43
Bituminous coal	14.7	406.50	46.5	8.74	13.6	331.16	40.1	8.26
Oil and gas extraction	5.6	281.46	43.4	6.48	5.6	271.60	41.8	6.49
Other	6.0	300.45	47.6	6.31	6.6	280.76	47.0	5.97
Mineral processing								
Blast furnaces and basic steel	47.1	335.93	40.1	8.38	44.1	307.45	40.0	7.68
Primary metal industries	11.8	243.36	43.0	5.65	18.9	245.27	40.9	6.00
Petroleum refining	12.4	388.95	44.3	8.78	12.3	337.20	42.3	7.98
Mineral product manufacturing								
Glass and glass products	12.1	254.20	37.9	6.71	12.8	248.88	40.5	6.15
Cement and clay products	4.3	255.97	42.2	6.07	4.1	210.65	40.8	5.16
Stone and other mineral products	19.6	278.91	42.1	6.63	15.5	246.98	41.6	5.93
Petroleum and coal products	16.4	364.29	44.0	8.27	16.2	316.76	42.7	7.42

Source: Illinois Department of Labor, Bureau of Employment Security.

TABLE 5—SELECTED MINERAL MATERIALS USED IN ILLINOIS, 1976 AND 1977

Commodity	Quantity unit	1977			1976		
		United States	Illinois	Illinois percentage of U.S. consumption	United States	Illinois	Illinois percentage of U.S. consumption
FUELS							
Coal	million tons	620.5	38.3	6.17	597.5	41.5	6.95
Coke	million tons	54.1	3.7	6.90	56.8	3.5	6.23 [a]
Distillate fuel oil	million bbl	1,231.0	58.5	4.75	1,150.9	58.9	5.11
Gasoline	million bbl	2,690.0	129.9	4.83	2,610.8	127.5	4.88
Kerosine	million bbl	63.8	1.3	2.04	62.6	1.5	2.40
Liquified petroleum gases and ethane	million bbl	519.6	22.8	4.40	514.0	23.5	4.57
Natural gas	trillion cu ft	19.5	1.2	6.15	20.8	1.2	5.77 [a]
Residual fuel oil	million bbl	1,120.1	27.3	2.44	1,025.1	23.7 [a]	2.31 [a]
METALS							
Pig iron	million tons	82.0	6.2	7.56	87.0	6.4	7.36
Lead	thousand tons	1,582.3	145.4	9.19	1,490.1	N.A.	N.A.
Zinc (slab)	thousand tons	1,101.8	N.A.	N.A.	1,134.1	155.4 [a]	13.70 [a]
CONSTRUCTION MATERIALS							
Air-cooled slag	million tons	22.8	N.A.	N.A.	22.9 [a]	N.A.	N.A.
Asphalt	million tons	31.0	2.2	7.10	27.4	1.8	6.57 [a]
Cement (portland)	million tons	78.6	3.6	4.58	72.6	3.8	5.18
Road oil	million tons	0.6	0.04	6.67	0.7	0.1	14.29
Sand and gravel	million tons	929.2	37.6	4.05	885.2	33.8	3.82
Stone	million tons	954.0	57.1	5.99	900.3	61.9	6.88
AGRICULTURAL & CHEMICAL MATERIALS							
Feldspar	thousand tons	734.6	37.0	5.04	730.8	N.A.	N.A.
Fluorspar	thousand tons	1,162.3	43.7	3.76	1,273.5	44.5	3.49
Lime [c]	thousand tons	19,987.0	1,031.0	5.16	20,257.0	1,007.5	4.97
Salt							
Evaporated	thousand tons	5,677.0	366.0	6.45	5,607.0	364.0	6.49
Rock	thousand tons	14,958.0	1,035.0	6.92	15,668.0	1,059.0	6.76

[a] Revised.

[b] NA = not available.

[c] Excludes regenerated lime.

Source: U.S. Bureau of Mines.

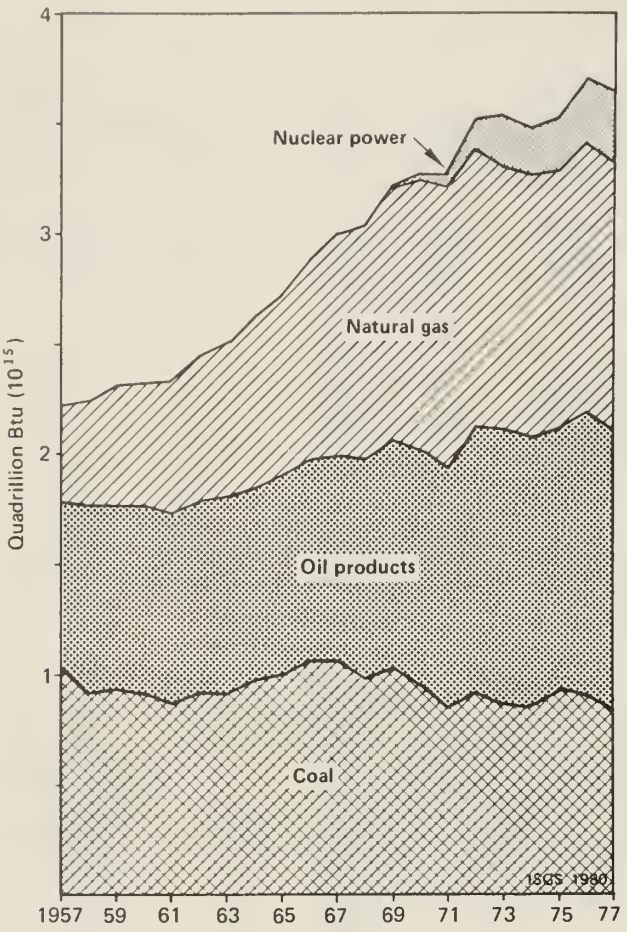

Figure 2. Total energy used in Illinois from 1957 through 1977, by type of fuel or energy source. Contribution of hydropower is too small to show. Although nuclear power has been used since 1960, its contribution prior to 1969 was too small to show.

INDIVIDUAL COMMODITIES

MINERAL MATERIALS MINED

The mineral materials mined in Illinois are categorized into four groups: fuels, industrial and construction materials, metals, and other materials.

Fuels

Coal

Production. Illinois continued to rank fourth (behind Kentucky, West Virginia, and Pennsylvania) among the nation's coal-producing states. Illinois producers mined a total of 53.9 million tons of coal valued at $931.1 million. This represents a 7.3 percent decrease in production from 1976, attributed to the unusually harsh winter of 1976-1977, persistent wildcat strikes, and the nationwide coal miners' strike that began on December 6, 1977. Nonetheless, the total value of production in 1977 increased 0.7 percent as a result of the increase in the average f.o.b. mine value of coal from $15.90 to $17.28 per ton.

In 1977, 22 counties—two more than in 1976—reported coal production (fig. 3). The ten leading counties—Perry, Randolph, Jefferson, Franklin, Macoupin, Fulton, Williamson, Douglas, Montgomery, and St. Clair—together contributed 79.4 percent of the total production (table 7). Surface mines operated in 14 counties; however, in only three counties—Perry, Randolph, and Fulton—were more than 2 million tons of coal mined by the surface method. Underground mines operated in 14 counties, but in only six of them (Franklin, Jefferson, Macoupin, Douglas, Montgomery, and Randolph) were more than 2 million tons mined by this method. In Perry County, the state's leading coal-producing county, all coal was surface mined.

Since 1833 a total of 4,671 million tons of coal has been produced from Illinois coal mines (table 8). Of this total, 991.7 million tons (21.2 percent) have been surface mined since the state's first large-scale surface mining operation began in Vermilion County in 1911. Although extensive surface mining did not begin in Illinois until the mid-1920s, more than 25 counties have been surface mined for coal at some time during the last 65 years.

The number of coal mines operating in Illinois has been generally declining since the early 1950s, when there were more than 150 mines in the state. Seventy mines—eight more than in 1976—operated in Illinois in 1977. Of the 70 mines, 45 were surface mines and 25 were underground mines. The 29.6 million tons produced from the 25 underground mines represented 54.9 percent of the total Illinois coal production (table 7). Since 1966 coal production in Illinois by underground mining has been gradually increasing (except for decreases due to strikes in the last two years). In contrast, production from surface mining, while showing annual fluctuations, has been generally declining (fig. 4). In 1977 production from the 45 surface mines totaled 24.3 million tons, a 10.8 percent decrease from 1976 surface mine production. This is 34.6 percent below peak surface mine production in Illinois in 1967, when 44 surface operations produced 37.1 million tons of coal. The primary factors responsible for this steady decline in surface-mine production in Illinois are the new, more stringent laws governing reclamation of surface mined land; the depletion of shallow, easily surface-minable coal deposits; the rising cost of Illinois farm land; and the rapid decline of Iliinois surface-mine productivity.

The average production and average number of employees per mine for both underground and surface operations are shown in table 9. Average output per underground mine in 1977 was 1.2 million tons, a decrease of 11.9 percent from the 1976 output. The average output per surface mine declined for the fifth year in a row: from 698,063 tons in 1976 to 539,810 tons in 1977, a decrease of 22.7 percent. The average number of employees at

TABLE 6—FUELS AND ENERGY CONSUMED IN ILLINOIS, 1976 AND 1977

Fuel	Units	1977	1976	Change from 1976-1977 (%)	Trillion Btu[a] 1977	Trillion Btu[a] 1976
Coal	thousand tons	38,299	41,455	- 7.6	842.6	912.0
Natural gas	million cu ft	1,167,099	1,187,712	- 1.7	1,203.3	1,224.5
Gasoline	thousand bbl	129,933	127,483	+ 1.9	681.9	669.0
Kerosine	thousand bbl	1,338	1,471	- 9.0	7.6	8.3
Distillate fuel oil	thousand bbl	58,459	58,877	- 0.7	340.5	343.0
Residual fuel oil	thousand bbl	27,293	23,659[b]	+15.4	171.6	148.7[b]
Liquid petroleum gases	thousand bbl	22,843	23,467	- 2.7	91.6	94.1
Hydropower	thousand kilowatt hr	108,697	111,645	- 2.6	1.1	1.2
Nuclear power	million kilowatt hr	28,547	26,455	+ 7.9	304.3	282.0
Total					3,644.5	3,682.8[b]
Illinois percentage of United States total energy consumption					5.17	5.35[b]
Percentage of total energy consumed in Illinois, by source:						
Coal					23.12	24.76
Natural gas					33.02	33.25
Oil products					35.48	34.30
Nuclear power					8.35	7.66
Hydropower					0.03	0.03
Total					100.00	100.00

[a] Fuel conversion factors: Coal—22,000,000 Btu/ton (@ 11,000 Btu/lb); Natural gas—1,031 Btu/Mcf; LPG—4,011,000 Btu/bbl; Gasoline—5,248,000 Btu/bbl; Kerosine—5,670,000 Btu/bbl; Distillate fuel oil—5,825,000 Btu/bbl; Residual fuel oil—6,287,000 Btu/bbl; Nuclear power—10,660 Btu/net kwh; Hydropower—10,478 Btu/kwh.

[b] Revised

TABLE 7—ILLINOIS COAL PRODUCTION, BY COUNTY, 1976 AND 1977

County	1977 Production[a] No. of mines	Underground (tons)	Surface (tons)	Total (tons)	Value[b]	1976 Production[a] No. of mines	Underground (tons)	Surface (tons)	Total (tons)	Value[b]
Christian	1[c]	497,895	—	497,895	8,603,626	1[c]	1,296,475	—	1,296,475	20,613,953
Clinton	1	99,504	—	99,504	1,719,429	—	—	—	—	—
Douglas	2	2,677,394	—	2,677,394	46,265,368	2	2,776,756	—	2,776,756	44,150,420
Franklin	4	4,750,772	—	4,750,772	82,093,340	3	4,927,675	—	4,927,675	78,350,033
Fulton	4	—	2,759,200	2,759,200	47,678,976	4	—	2,888,718	2,888,718	45,930,616
Gallatin	2	1,075,785	530,629	1,606,414	27,758,834	2	1,324,826	527,064	1,851,890	29,445,051
Jackson	5	—	1,467,700	1,467,700	25,361,856	5	—	761,474	761,474	12,107,437
Jefferson	4	4,333,868	434,219	4,768,087	82,392,543	4	4,667,694	504,430	5,172,124	82,236,772
Johnson	1	—	1,100	1,100	19,008	—	—	—	—	—
Knox	1	—	1,151,893	1,151,893	19,904,711	1	—	1,534,248	1,534,248	24,394,543
Macoupin	2	3,622,966	—	3,622,966	62,604,852	2	3,257,007	—	3,257,007	51,786,411
Montgomery	1[c]	2,572,547	—	2,572,547	44,453,612	1[c]	2,645,953	—	2,645,953	42,070,653
Peoria	1	—	917,492	917,492	15,854,262	1	—	716,653	716,653	11,394,783
Perry	5	—	9,559,010	9,559,010	165,179,693	5	—	11,378,602	11,378,602	180,919,772
Randolph	7[d]	2,445,126	4,581,057	7,026,183	121,412,442	7[d]	1,977,913	5,425,092	7,403,005	117,707,780
St. Clair	2[d]	1,903,635	449,735	2,353,370	40,666,234	2[d]	2,686,644	448,825	3,135,469	49,853,957
Saline	6	968,359	839,357	1,807,716	31,237,332	5	1,097,751	962,888	2,060,639	32,764,160
Sangamon	c	1,591,209	—	1,591,209	27,496,092	c	1,120,115	—	1,120,115	17,809,829
Stark	1	—	110,187	110,187	1,904,031	1	—	298,319	298,319	4,743,272
Vermilion	1	—	121,560	121,560	2,100,557	1	—	79,058	79,058	1,257,022
Wabash	1	1,717,690	—	1,717,690	29,681,683	1	1,822,854	—	1,822,854	28,983,379
Williamson	18	1,332,227	1,368,318	2,700,545	46,665,418	14	1,310,033	1,699,077	3,009,110	47,844,849
Total	70	29,588,977	24,291,457	53,880,434	931,053,899	62	30,911,696	27,224,448	58,136,144	924,364,692
Total (%)		54.9	45.1				53.2	46.8		

[a] Production figures, Illinois State Department of Mines and Minerals, Annual Coal, Oil and Gas Report, 1976 and 1977.

[b] Value calculated at an average of $15.90 per ton for 1976 and $17.28 for 1977.

[c] One mine operated at junction of Christian, Montgomery, and Sangamon Counties.

[d] Two mines operated at junction of Randolph and St. Clair Counties.

TABLE 8—CUMULATIVE COAL PRODUCTION IN ILLINOIS BY COUNTY, 1883-1977

County	Cumulative production[a] (tons)	Years active	Last year active
Adams	341,924	26	1969
Bond	7,355,569	57	1942
Brown	65,347	40	1963
Bureau	53,823,055	80	1964
Calhoun	96,247	27	1912
Cass	212,477	53	1941
Christian	299,989,905	93	1977
Clark	4,482	2	1955
Clay	801	1	1963
Clinton	38,755,829	80	1977
Coles	198,932	6	1888
Crawford	45,400	16	1961
Douglas	24,546,209	32	1977
Edgar	915,698	41	1952
Effingham	796	1	1890
Franklin	601,082,496	79	1977
Fulton	297,010,679	96	1977
Gallatin	26,720,016	93	1977
Greene	693,191	84	1967
Grundy	44,494,989	91	1973
Hamilton	22,097	16	1905
Hancock	771,281	72	1958
Hardin	40	1	1890
Henry	22,910,053	84	1965
Jackson	99,866,184	96	1977
Jasper	23,739	11	1939
Jefferson	105,898,250	74	1977
Jersey	120,350	59	1951
Johnson	303,908	61	1977
Kankakee	8,858,008	45	1969
Knox	64,072,178	94	1977
La Salle	65,547,638	79	1960
Livingston	10,111,437	80	1961
Logan	14,533,376	84	1968
Macon	11,000,468	65	1947
Macoupin	284,311,714	95	1977
McDonough	2,634,903	69	1951
McLean	5,544,139	47	1928
Madison	164,295,772	83	1964
Marion	39,247,722	82	1963
Marshall	12,516,141	70	1951
Menard	13,462,005	84	1965
Mercer	15,519,862	86	1973
Monroe	8,284	13	1941
Montgomery	139,651,446	96	1977
Morgan	190,787	64	1951
Moultrie	2,032,236	16	1924
Peoria	93,912,774	96	1977
Perry	318,452,149	96	1977
Pike	5,081	8	1942
Pope	23,747	14	1972
Putnam	10,071,893	29	1938
Randolph	148,691,089	96	1977
Richland	154	1	1890
Rock Island	3,846,169	67	1948
St. Clair	343,528,956	96	1977
Saline	249,267,234	96	1977
Sangamon	245,993,641	90	1977
Schuyler	7,747,691	84	1966
Scott	612,476	61	1942
Shelby	4,119,763	67	1950
Stark	9,569,336	87	1977
Tazewell	17,633,802	75	1956
Vermilion	165,173,007	96	1977
Wabash	5,786,961	41	1977
Warren	685,466	73	1954
Washington	18,165,386	88	1969
White	1,676,741	36	1940
Will	44,265,271	93	1974
Williamson	420,644,266	96	1977
Woodford	7,810,160	70	1951
Total cumulative production, 1882-1976	4,597,491,273		
Estimated production, all counties 1833-1881	73,386,123		
Total cumulative production, 1833-1976	4,670,877,396		

Production figures: Illinois State Department of Mines and Minerals, Annual Coal, Oil, and Gas Reports.

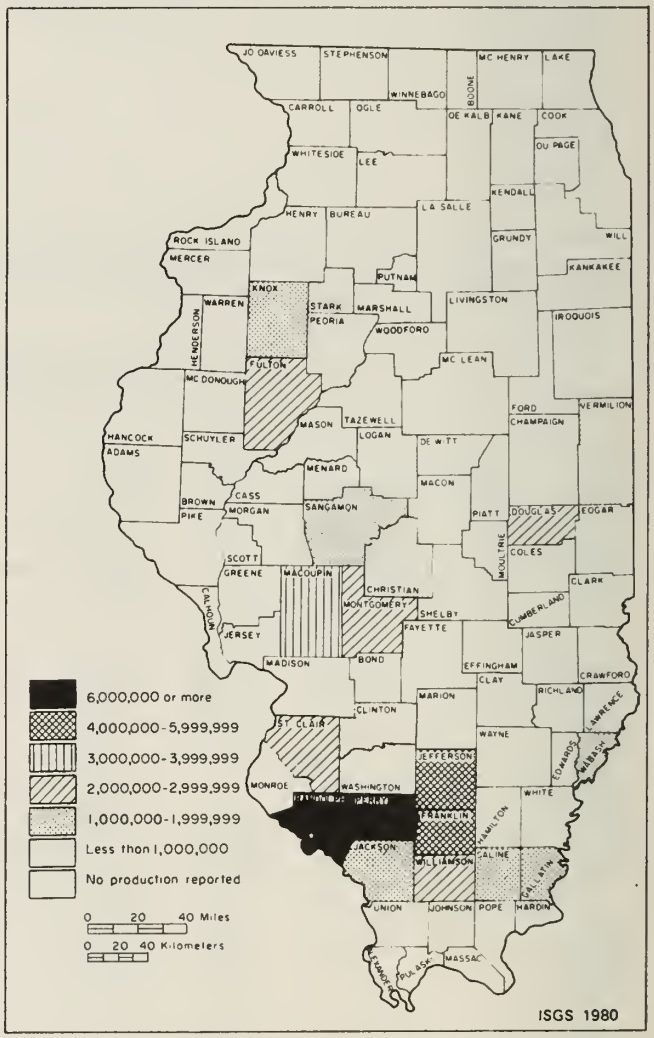

Figure 3. Illinois coal production by county, 1977.

both surface and underground mines decreased again in 1977 for the second year.

In 1977, 28 coal mining companies operated in Illinois. Production from each company is shown in table 10. Peabody Coal, Consolidated Coal, Freeman United Coal Mining, and AMAX Coal continued to be the four largest companies, and jointly accounted for 57.89 percent of the coal mined in the state.

Employment and wages. According to the Illinois Department of Mines and Minerals, 16,114 persons were working in Illinois coal mines in 1977—11,375 in underground mining operations and 4,739 in surface mine operations. This was an 8.2 percent increase over the 14,788 persons employed in 1976—11,375 in underground operations and 4,739 in surface operations. The number of employees per mine is higher in Illinois than in any other leading coal-producing state. Most of Illinois' coal output was produced by United Mine Workers (UMW) members.

The Illinois Department of Labor reported that the average hourly earnings for bituminous coal miners increased from $8.26 in 1976 to $8.74 in 1977 (table 4). The average number of hours worked increased from 40.1 to 46.5.

Mine productivity. Mine productivity is measured in tons per person-day. The number of tons per person-day represents the average amount of coal, in tons, mined by a single miner working an 8-hour shift. Average productivity of underground mines in Illinois began to decline in 1970 when the Federal Health and Safety Act of December 1969 went into effect. In 1977, productivity further declined to 12.84 tons per person-day, the lowest level of productivity achieved by Illinois underground mines since 1954 (about 42.08 percent below the 1969 peak level of 22.17 tons per person-day). In spite of this decline, the productivity level achieved by Illinois underground mines was largest in the nation among the major coal-producing states (fig. 5).

The average productivity level achieved in 1977 by Illinois surface mines was 19.17 tons per person-day—down 15.8 percent from the 1976 level. The decline in surface mine productivity is due in part to the increase in average thickness of overburden that must be removed before the coal can be extracted and in part to the additional personnel required to produce a ton of coal in compliance with the rising demand for reclamation.

Prices. The average price of Illinois coal, f.o.b. mine, in 1977 was $17.28 per ton, 8.7 percent higher than the 1976 level. The average price, f.o.b. mine, of coal mined underground in Illinois in 1977 was $18.34 per ton, $2.35 higher than the price of surface mined coal.

Shipments. Illinois coal is shipped to various parts of the United States for use by electric utilities, for manufacturing

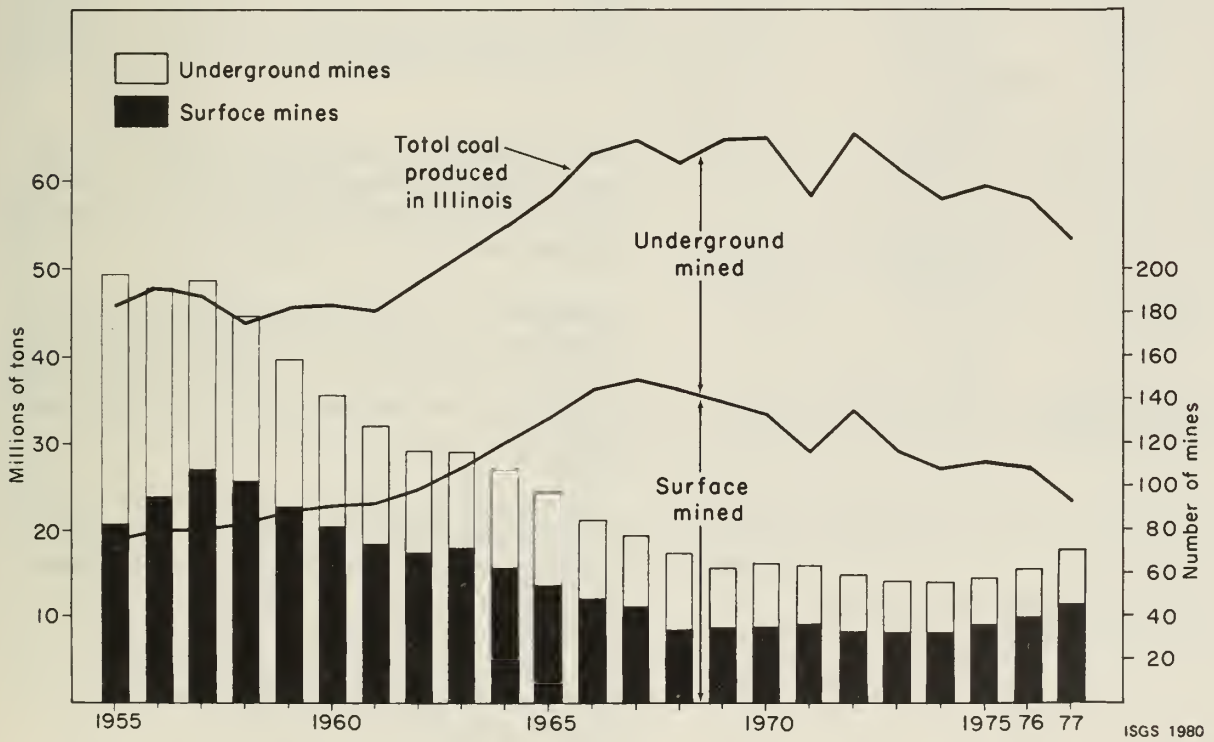

Figure 4. Trends in coal production in Illinois, 1955-1977.

coke, and for other industrial purposes. Of the 54.4 million tons of Illinois coal shipped in 1977, including mine stock, 45.1 million tons were used by electric utilities, 3.0 million tons by coke plants manufacturing metallurigical coke, and 6.0 million tons by industrial plants. The remaining 256,000 tons were sold to retail dealers (table 11). About 43.59 percent of the Illinois coal shipped to electric utilities was consumed within the state; the remainder was shipped to surrounding midwestern states and to southeastern states. The market for Illinois utility coal in Missouri declined in 1977 for the first time in several years. The market for Illinois utility coal continued to grow in the southeastern states of Georgia, Florida, Mississippi, and Tennessee, where electric power demands are growing rapidly and Illinois coal competes favorably with higher-priced Appalachian coal. However, in Wisconsin, Minnesota, Michigan, and Iowa, and within Illinois itself, Illinois has been losing its utility market to the low-sulfur coals from western states which meet the required standards for the emission of sulfur oxides. Illinois use of its own coal for utilities was down 13.9 percent for 1976.

Approximately 29.0 percent of the Illinois coal shipped for coking purposes was consumed in Illinois, and most of the remainder was shipped to nearby coke plants in northwestern Indiana. There were no shipments of coal to Mexico for coke manufacture in 1977.

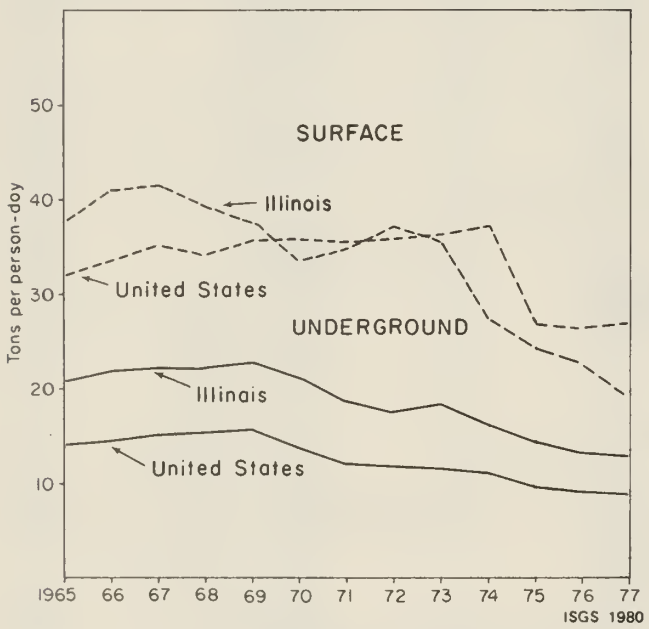

Figure 5. Trends in coal mine productivity, 1965-1977.

About 68.4 percent of the retail coal shipped from Illinois in 1977 was consumed within the state. The other important consumers of industrial coal from Illinois, in order of amount consumed, were Missouri, Iowa, Wisconsin, Indiana, and Michigan.

Transportation. In 1977 Illinois coal was shipped from the mine to the consuming sector by railroad, barge, truck, and conveyor belt. At the mine sites 42.5 million tons of coal were loaded on railroad cars for shipment; of this amount 15.8 percent (6.7 million tons) was moved to docks for shipment by barge. The total amount of coal shipped by barge (including the 6.7 million tons shipped by rail to the barge) was 12.1 million tons. Coal shipped by truck totaled 1.3 million tons. The remaining 4.5 million tons were shipped to mine-mouth electric generating plants by conveyor belt.

Tonnage of Illinois coal handled by specific railroads in 1977 are:

Railroads	Tons
Missouri Pacific Lines	11,824,234
Illinois Central Gulf Railroad Co.	10,891,458
Burlington Northern, Inc.	6,235,736
Chicago & Northwestern Transportation Co.	3,061,020
Conrail	2,846,328
Chicago & Eastern Illinois Railroad	1,744,045
Missouri & Illinois Railroad	1,739,825
Others	4,182,631
Total coal shipped by rail	42,525,277

Of the 13 railroads moving Illinois coal in 1977, the top three handled 68.1 percent of the total: Missouri Pacific Lines, 27.8 percent; Illinois Central Gulf, 25.6 percent; and Burlington Northern, 14.7 percent.

Consumption. Coal consumed in Illinois in 1977 totaled 38.3 million tons (table 12), 7.6 percent less than that in 1976. The coal-consuming sectors included electric utilities (83.6 percent), coke and gas plants (6.4 percent), retail dealers (0.9 percent), and industrial and other users (9.1 percent).

Of the total 38.3 million tons of coal used in Illinois in 1977, 21.8 million tons, or 52.5 percent, were shipped from mines within the state. The amount of coal shipped from mines in Illinois for use in Illinois is continuing to decline (down 12.8 percent from 1976), mainly because of the replacement of Illinois coal in the utility market by low-sulfur western coals, and in the industrial market by low-sulfur Appalachian coal, natural gas and fuel oil. In 1977, 30.7 percent (as compared to 9.5 percent in 1971) of the total coal consumed in Illinois came from western states, primarily Colorado, Montana, Utah, and

TABLE 9—COAL MINES, MINING EMPLOYEES, AVERAGE PRODUCTION, AND AVERAGE NUMBER OF EMPLOYEES, BY METHOD OF MINING IN ILLINOIS, 1968-1977

	Underground				Surface			
Year	No. of mines	No. of employees	Average output per mine (tons)	Average no. of employees per mine	No. of mines	No. of employees	Average output per mine (tons)	Average no. of employees per mine
1968	36	6,028	724,568	167	33	3,510	1,092,535	106
1969	28	5,944	1,077,237	212	34	3,647	1,019,411	107
1970	29	6,785	1,090,192	233	35	3,429	950,530	98
1971	27	7,088	1,090,886	262	36	3,483	804,480	97
1972	26	7,870	1,219,838	303	33	3,367	1,024,412	102
1973	24	7,794	1,357,390	325	32	3,615	905,353	113
1974	23	8,718	1,352,353	379	32	3,749	842,767	117
1975	21	9,549	1,518,099	455	36	4,097	768,304	114
1976	23	10,396	1,343,987	452	39	4,392	698,063	113
1977	25	11,375	1,183,159	455	45	4,739	539,810	105

Source: Illinois State Department of Mines and Minerals, Annual Coal, Oil, and Gas Report, 1968-1977.

TABLE 10—ILLINOIS COAL PRODUCTION, BY COMPANY, 1977

Rank	Company	No. of Mines		Production (tons)	Percentage of total production	No. of employees
		Underground	Surface			
1	Peabody Coal	4	4	11,148,373	20.69	3,596
2	Consolidated Coal	1	5	8,216,200	15.25	1,684
3	Freeman United Coal Mining	4	2	6,751,464	12.53	2,746
4	AMAX Coal	1	3	5,073,583	9.42	1,273
5	Old Ben Coal	4	0	4,750,772	8.82	1,905
6	Southwestern Illinois Coal	0	2	4,124,145	7.65	583
7	Zeigler Coal	5	0	3,973,840	7.37	1,430
8	Midland Coal	0	4	2,629,257	4.88	574
9	Monterey Coal	2	0	2,624,319	4.87	695
10	Sahara Coal	2	1	1,646,297	3.05	632
11	Inland Steel	1	0	1,593,790	2.96	612
12	Robertson & Associates	0	1	434,219	0.81	85
13	Williamson Coal	0	1	208,839	0.39	47
14	Southern Illinois Minerals*	0	5	139,827	0.26	93
15	Jader Fuel	0	2	138,649	0.26	17
16	Lee Coal	0	1	121,560	0.22	8
17	Harrisburg Coal	1	0	84,623		54
18	Brown Bros. Excavating	0	1	62,648		8
19	E & B Coal	0	2	61,392		14
20	Central States Mining	0	1	27,130		16
21	Big Ridge Coal	0	1	22,563		10
22	Cold Water Coal	0	1	12,630	0.57	2
23	Claude White	0	1	8,849		4
24	Crenshaw Coal	0	2	8,030		10
25	Oxford Construction	0	2	6,270		6
26	D. D. Thomas	0	1	5,757		7
27	Malone Coal	0	1	3,398		2
28	Illinois Coal, Oil & Gas	0	1	2,000		2
	Totals	25	45	53,880,434	100.00	16,115[a]

[a] 11,375 underground and 4,740 surface.

Source: Illinois State Department of Mines and Minerals, Annual Coal, Oil, and Gas Report, 1977.

* Changed name from Three States Trucking, Inc.

Wyoming. The amount of western coal shipped to Illinois rapidly increased from about 1971 when extensive development of western coal fields began and the Federal Health and Safety Act went into effect. The increase in western coal shipments to Illinois from 1976 to 1977 was 82.5 percent.

Although Indiana, Kentucky, and West Virginia shipped coal into Illinois for use by electric utilities (table 12), about 34.1 percent of the total 32.0 million tons consumed by Illinois electric utilities in 1977 came from western states. In 1977 electric utilities in Illinois paid an average $1.295 per million Btu for Wyoming coal and $1.545 per million Btu for Colorado coal, as compared to $0.860 per million Btu for Illinois coal. Nevertheless, the use of western coal by Illinoi electric utilities is increasing and is expected to continue until dependable, economically feasible methods are developed for removing sulfur from Illinois coal. Under the June 1979 New Source Performance Standards of the Clean Air Act, installation of scrubbers and 70-90 percent sulfur removal are mandated in all new coal burning units constructed after September 18, 1978; however, dependability of scrubbers over longer periods must be improved for satisfactory application.

Of the coal used at coke and gas plants in Illinois in 1977, 35.5 percent came from Illinois mines; 53.0 percent from mines in West Virginia and eastern Kentucky; and 9.6 percent from the western and western interior states.

The amount of coal used in 1977 for industrial and other purposes in Illinois increased 10.1 percent over 1976 (table 12). Illinois supplied 65.8 percent of the coal consumed in Illinois industrial use. Other principal regions supplying coal for Illnois industrial use were West Virginia, eastern Kentucky, and the western states.

Retail dealers sold considerably less coal in 1977 than in 1976. Illinois mines supplied 50.9 percent of the total 344,000 tons of Illinois retail coal, West Virginia and Kentucky mines supplied 42.2 percent, and western states supplied the remainder.

TABLE 11—ILLINOIS COAL SHIPMENTS, BY STATE DESTINATION AND CONSUMING SECTOR, 1973-1977
(1000 tons)

Consuming sector	Wisconsin	Minnesota & Michigan	Iowa	Missouri	Indiana	Kentucky	Georgia & Florida	Other[a] states	Exports[b] and miscellaneous	Illinois	Total
Electric utilities											
1973	4,599	2,254	2,714	8,014	2,167[d]	2,923	763[c]	2,129[c]	51	24,091	49,705
1974	4,123	1,992	2,304	9,148	3,028[d]	2,006	1,015	1,362	7	21,828	46,856
1975	4,595	2,013[d]	2,290	10,496	3,081[d]	1,982	987	1,834	—	22,006	49,284
1976	4,129	1,967[d]	2,090	12,084	3,261	1,487	1,525	993	—	21,414	48,950
1977	3,839	1,863[d]	1,865	11,822	3,791	997	1,440	1,056	—	18,432	45,105
Coke and gas plants											
1973	—	—	—	—	3,164[d]	—	—	—	126	1,148	4,438
1974	—	—	—	—	3,361[d]	—	—	—	237	1,054	4,652
1975	—	—	—	—	2,959[d]	—	—	—	229	1,081	4,269
1976	—	—	—	—	2,536	—	—	—	43	982	3,561
1977	—	—	—	—	2,039	—	—	73	—	862	2,974
Retail dealers											
1973	2	17	14	168	43	—	—	—	2	417	663
1974	4	6	16	136	20	—	—	9	9	291	482
1975	1	—	7	100	14	—	—	—	12	196	330
1976	—	—	14	102	7	—	—	—	13	324	460
1977	1	4[d]	7	43	8	—	—	1	17	175	256
All others											
1973	645	503	1,151	1,367	639	—	—	—	12	3,419	7,736
1974	556	491[d]	867	1,464	513	—	—	23	29	3,193	7,095
1975	514	315[d]	720	1,458	219	—	—	9	8	2,761	6,146
1976	534	265[d]	735	1,486	276	—	—	—	7	2,252	5,555
1977	600	270[d]	755	1,540	570	—	—	3	1	2,298	6,037
Totals											
1973	5,246	2,774	3,879	9,549	6,013	2,923	763	2,129	191	29,075	62,542
1974	4,694	2,489	3,187	10,748	6,922	2,006	1,015	1,394	232	26,366	59,085
1975	5,110	2,328	3,017	12,054	6,273	1,982	987	1,843	249	26,044	60,029
1976	4,663	2,232	2,839	13,672	6,080	1,487	1,525	993	63	24,972	58,526
1977	4,440	2,137	2,627	13,405	6,408	997	1,440	1,133	18	21,767	54,372

[a] Includes AL (1973-1977), MS (1973-1977), TN (1973-1977), OH (1974-1977), ND (1974), LA, WA, and PA (1977).
[b] Primarily to Mexico and Canada.
[c] Includes minor amount of industrial and/or retail coal.
[d] Estimated.

Source: U.S. Bureau of Mines Bituminous Coal and Lignite Distribution Quarterly, 1973-1977.

TABLE 12—SHIPMENT OF COAL FOR CONSUMPTION IN ILLINOIS, BY AREA OF ORIGIN AND CONSUMING SECTOR, 1973-1977
(1000 tons)

Consuming sector	Illinois	Western Kentucky	Indiana	Ohio, eastern Pennsylvania and and northern West Virginia[a]	Southern West Virginia Virginia and eastern Kentucky[b]	Western Interior states[c]	Western states	Montana and Washington[e]	Total coal consumed in Illinois
Electric utilities									
1973	24,091	1,662	385[f]	—	142	30[f]	13[f]	6,142[g]	32,465
1974	21,828	1,115	367	—	96	—[f]	1,351[f]	6,080[f]	30,837
1975	22,006	844	371	—[f]	174	90[f]	1,906[f]	9,462	34,853
1976	21,414	1,330	477	2[f]	559	100[f]	2,370[f]	8,759	35,011
1977	18,432	1,185	459	39[f]	995	105[f]	4,651[f]	6,166	32,032
Coke & gas plants									
1973	1,148	—	—[f]	8	1,812	—[f]	—[f]	—	2,968
1974	1,054	—	—	56	1,990	—[f]	—[f]	—	3,100
1975	1,081	—	—	40[f]	1,776	64[f]	133[f]	—	3,094
1976	982	—	—	35[f]	1,541	47[f]	130[f]	—	2,735
1977	862	—	—	47[f]	1,288	87[f]	147[f]	—	2,431
Retail dealers									
1973	417	6	—[f]	—	511	—[f]	—[f]	—	934
1974	291	3	—	—	419	3[f]	56[f]	—	772
1975	196	2	—	—	253	41[f]	15[f]	—	507
1976	324	3	—	2[f]	191	7[f]	10[f]	—	537
1977	175	2	—	40	103	6[f]	18[f]	—	344
All others									
1973	3,419	111	40[f]	9	638	37[f]	7[f]	—[f]	4,261
1974	3,193	151	126	5	592	86[f]	185[f]	7	4,345
1975	2,761	55	15	3[f]	481	40[f]	135[f]	4	3,494
1976	2,252	48	—	2[f]	408	67[f]	395[f]	—	3,172
1977	2,298	56	62	70	443	78[f]	485[f]	—	3,492
Total									
1973	29,075	1,779	425	17	3,103	67	20	6,142[g]	42,028
1974	26,366	1,269	493	61	3,097	89	1,592	6,087	39,054
1975	26,044	901	386	43	2,684	235	2,189	9,466	41,948
1976	24,972	1,381	477	41	2,699	221	2,905	8,759	41,455
1977	21,767	1,243	521	196	2,829	276	5,301	6,166	38,299

[a] Includes Districts 1, 3, 4, and 6 (MD, OH, eastern PA, northern WV).
[b] Includes Districts 7, 8, and 13 (AL, GA, eastern KY, NC, TN, VA, southern WV).
[c] Includes Districts 14 and 15 (AR, KS, MO, OK, TX).
[d] Includes Districts 16, 17, 19-21 (CO, ID, ND, NM, SD, UT, WY).
[e] Includes Districts 22 and 23 (AK, MT, OR, WA).
[f] Estimated; includes minor amounts of coal shipped to other consuming sectors.
[g] Includes coal produced in District 19 (WY & ID).
Source: U.S. Bureau of Mines, Bituminous Coal and Lignite Distribution, Calendar Years 1973-1977.

Crude oil

Production. Illinois crude oil production, from 23,758 wells, totaled 25.6 million barrels in 1977—2.5 percent less (664,038 fewer barrels) than in 1976. Based on an average unit value of $12.27 per barrel, the production was valued at $314.3 million (table 13). Of the 25.6 million barrels produced in 1977, 15.2 million barrels were produced by secondary-recovery methods (fig. 6), 15.0 million barrels by waterflooding, and 174,400 barrels by pressure-maintenance projects.

Forty-three counties produced crude oil in 1977. The ten largest oil-producing counties contributed in 76.4 percent of the state's oil production in 1977 as follows:

County	(%)	County	(%)
Wayne	14.7	Crawford	6.1
Lawrence	12.1	Clay	4.1
White	11.5	Wabash	3.6
Marion	10.6	Richland	3.5
Fayette	7.8	Jefferson	2.4

Thirteen of the 390 oil fields producing in Illinois in 1977 contributed 69.9 percent of the production (table 14). The southeastern Illinois area, which contains a number of fields, accounted for 19.6 percent of the state's production. The four largest fields—Southeastern Illinois, Clay City Consolidated, Salem Consolidated, and Louden—accounted for 51.2 percent of the 1976 crude-oil production in Illinois.

Crude oil production trends are shown in figure 6. Crude-oil production reached a peak of 146.8 million barrels in Illinois in 1940. From 1940 to 1974 oil production by primary-recovery methods declined fairly steadily (except for slight increases in 1954-1956 and again in 1962); production has increased slightly since 1974. Illinois began producing significant amounts of crude oil by secondary-recovery methods, primarily waterflooding, in the early 1940s. Increased waterflooding activity, in conjunction with the introduction of the hydrofrac (hydraulic fracturing) method of well completion in 1954, reversed the downward trend of total oil production from 1954 through 1962. Since that time both primary and secondary production has declined steadily as reserves have

been depleted. The extent of this depletion can be seen by comparing the January 1956 reserves figure of 701,300,000 barrels with the January 1978 figure of 149,959,000 barrels.

Refineries. According to the U.S. Bureau of Mines, 14 refineries were operating in Illinois as of January 1, 1978, with a total capacity of 1,191,200 barrels per calendar day—0.19 percent less than the capacity of a year earlier.

Of the 404.6 million barrels of crude oil received at Illinois refineries in 1977, 201.2 million barrels came from other states and 190.7 million barrels from foreign countries; the rest was of Illinois origin.

TABLE 13—CUMULATIVE CRUDE OIL PRODUCTION IN ILLINOIS, BY COUNTY, 1888-1977

County	Cumulative production, 1888-1977[a] (1000 bbl)	1977 Production[b] (1000 bbl)	1977 Percentage of total Illinois production	1977 Value[c] (in thousands)
Adams	122	4	0.0	49
Bond	7,344	49	0.2	601
Brown	239	3	0.0	37
Champaign	7	—	—	—
Christian	25,715	292	1.1	3,583
Clark-Cumberland	90,803	380	1.5	4,663
Clay	133,183	1,047	4.1	12,847
Clinton	84,271	395	1.5	4,847
Coles	23,164	171	0.7	2,098
Crawford	230,206	1,570	6.1	19,264
De Witt	2,991	112	0.4	1,374
Douglas	3,603	8	0.0	98
Edgar	3,762	73	0.3	896
Edwards	46,626	499	2.0	6,123
Effingham	16,347	396	1.6	4,859
Fayette	391,642	1,997	7.8	24,503
Franklin	71,257	449	1.8	5,509
Gallatin	50,548	447	1.7	5,485
Hamilton	132,341	468	1.8	5,742
Jackson	8	3	0.0	37
Jasper	51,395	527	2.1	6,466
Jefferson	82,755	619	2.4	7,595
Lawrence	392,579	3,087	12.1	37,877
Macon	934	15	0.1	184
Macoupin	258	5	0.0	61
Madison	17,369	89	0.4	1,092
Marion	408,830	2,701	10.6	33,141
McDonough-Hancock[b]	5,509	28	0.1	344
Monroe	7	4	0.0	49
Montgomery	120	1	0.0	12
Moultrie	101	2	0.0	25
Perry	309	14	0.1	172
Randolph	4,474	62	0.2	761
Richland	101,652	888	3.5	10,896
St. Clair	3,390	29	0.1	356
Saline	21,308	163	0.6	2,000
Sangamon	3,200	134	0.5	1,644
Schuyler	1	—	—	—
Shelby	1,700	34	0.1	417
Wabash	108,463	929	3.6	11,399
Washington	30,736	440	1.7	5,399
Wayne	243,386	3,764	14.7	46,184
White	282,353	2,951	11.5	36,209
Williamson	2,180	179	0.7	2,196
Other[a]	4,102	580	2.3	7,117
Total[d]	3,081,858	25,608	100.0	314,293

[a] 1977 production includes 580 thousand barrels which could not be assigned to individual fields or counties.
[b] No oil production reported for Hancock County in 1971-1977.
[c] Value calculated at average price of $12.27 per barrel.
[d] Does not add due to independent rounding.

Source: Illinois State Geological Survey Oil and Gas Section.

TABLE 14—ILLINOIS CRUDE OIL PRODUCTION, BY MAJOR FIELD, 1977

Field	County	Crude oil production (1000 bbl)	Percentage of state total
Southeastern Illinois	Wabash Lawrence Crawford Clark Cumberland Jasper	5,027.4	19.6
Clay City Consolidated	Clay Wayne Richland Jasper	3,474.1	13.6
Salem Consolidated	Marion Jefferson	2,582.9	10.1
Louden	Fayette Effingham	2,032.1	7.9
New Harmony Consolidated	White Wabash Edwards	1,296.4	5.1
Keenville	Wayne	707.0	2.8
Phillipstown Consolidated	White Edwards	590.3	2.3
Sailor Springs Consolidated	Clay Jasper Effingham	576.2	2.2
Roland Consolidated	White Gallatin	436.1	1.7
Johnsonville Consolidated	Wayne	345.3	1.3
Johnsonville South	Wayne	299.8	1.2
Dale Consolidated	Franklin Hamilton Saline	284.4	1.1
Storm Consolidated	White	253.6	1.0
Subtotal		17,905.6	69.9
Others		7,702.5	30.1
Total		25,608.1	100.0

Source: Illinois State Geological Survey Oil and Gas Section.

Substitute natural gas plants. Illinois contains two of the 13 plants in the nation which produce substitute natural gas (SNG). The Northern Illinois Gas Company plant near Morris in Grundy County was the only plant operating in Illinois in 1975. In early 1976 another SNG plant, operated by People's Gas, Light and Coke Company, opened near Elwood in Will County. The combined daily capacity of these two plants is approximately 320 million cubic feet. Many of the SNG plants that were in the planning stages in various parts of the country have been cancelled or indefinitely postponed because of the Federal Energy Administration's restrictive policy regarding the allocation of petroleum feedstocks for SNG production.

Consumption. Table 15 shows that consumption of major petroleum products in Illinois increased by 1.92 percent over 1976. Gasoline consumption in Illinois represented

TABLE 15—CONSUMPTION OF MAJOR PETROLEUM PRODUCTS IN ILLINOIS, 1973-1977

Product	Unit	1977	1976	1975	1974	1973
Gasoline (excluding naphtha)[a]	thousand bbl	129,933	127,483	121,127	119,637	120,198[e]
Kerosine[b]	thousand bbl	1,338	1,471	2,702	3,274	4,485
Distillate fuel oil[b]	thousand bbl	58,459	58,877	52,103	53,950	54,288
Residual fuel oil[b]	thousand bbl	27,293	23,659[e]	26,948	28,521	28,795
Liquefied gases[c]	thousand gal					
Propane		946,213	973,325	800,697	724,708	650,115
Butane		12,955	12,080	10,344	9,413	9,597
Butane-propane mix		229	202	189	319	801
Total		959,397	985,607	811,230	734,440	660,513
Asphalt[e]	tons	2,159,575	1,795,978[e]	1,830,462	1,792,502	2,096,879
Road oil[e]	tons	39,387	52,366	72,846	179,891	236,972

[a] Basic Petroleum Data Book, American Petroleum Institute.
[b] U.S. Bureau of Mines Sales of Fuel Oil and Kerosine, Annual Statements, 1976-1975.
[c] U.S. Bureau of Mines Sales of Liquefied Petroleum Gases and Ethane, Annual Statements, 1976-1975.
[d] U.S. Bureau of Mines Sales of Asphalt, Annual Statements, 1976-1975.
[e] Revised.

4.83 percent of the total amount of gasoline consumed in the United States (table 15).

Distillate fuel oil consumption decreased slightly (0.7 percent) and residual fuel oil consumption increased 15.4 percent in 1977.

Consumption of kerosine in Illinois during 1977 decreased 9.0 percent and consumption of liquefied gas decreased 2.7 percent. The use of asphalt products in the state increased by 20.2 percent; consumption of road oil declined by 24.8 percent.

Natural gas

Production. Natural gas is produced in Illinois from gas wells and oil wells; however, none of the gas from oil wells is marketed, and the amount of gas produced from oil wells is too small to be shown in table 17. This gas is used for lease fuel in oil-producing operations or is flared at the well. In 1977, 1,003 million cubic feet of gas was marketed (table 16) at an average wellhead value of $1.20 per thousand cubic feet (Mcf). This was a 21.8 percent increase in value over 1976. The total value of the marketed gas is calculated to be $1,203,600.

Although the amount of natural gas marketed from Illinois fields in 1977 was down 35.5 percent from the 1976 level, the amount of natural gas marketed in Illinois fields has increased considerably in most of the last few years. In 1970, for example, only 198 million cubic feet were marketed, as compared with 1,003 million cubic feet in 1977.

As shown in table 17, natural gas is presently being recovered in five counties: Coles furnished 848.1 Mcf

TABLE 16—PRODUCTION OF NATURAL GAS IN ILLINOIS, 1973-1977

	Production (million cu ft)				
	Withdrawals			Disposition	
Year	From gas wells	From oil wells	Total	Marketed	Flared
1973	1,638	—[a]	1,638	1,638	—
1974	1,436	—[a]	1,436	1,436	—
1975	1,440	—[a]	1,440	1,440	—
1976	1,556	—[a]	1,556	1,556	—
1977	1,003	—[a]	1,003	1,003	—

[a] Not reported separately; included under gross withdrawals from gas wells.

Source: U.S. Bureau of Mines, Minerals Yearbooks, 1973-1977.

TABLE 17—PRODUCTION OF NATURAL GAS IN ILLINOIS BY FIELD AND COUNTY, 1976 AND 1977

Gas field	County	Production (million cu ft) 1977	1976	Percentage of change 1976-1977
Eldorado Consol.	Saline	4.6	20.2	- 77.2
Eldorado East	Saline			
	Gallatin	33.4	37.3	- 10.5
Harco East	Saline	19.0	18.4	+ 3.3
Herold Consol.	Gallatin	—	4.8	—
Johnston City East	Williamson	37.5	55.3	- 32.2
Mattoon	Coles	848.1	1,198.5	- 29.2
Raleigh	Saline	14.3	18.3	- 21.9
Stiritz	Williamson	6.7	13.2	- 49.2
Stubblefield South	Bond	39.8	190.5	- 79.1
Total		1,003.4	1,556.4	- 35.5

Source: Illinois State Geological Survey Oil and Gas Section.

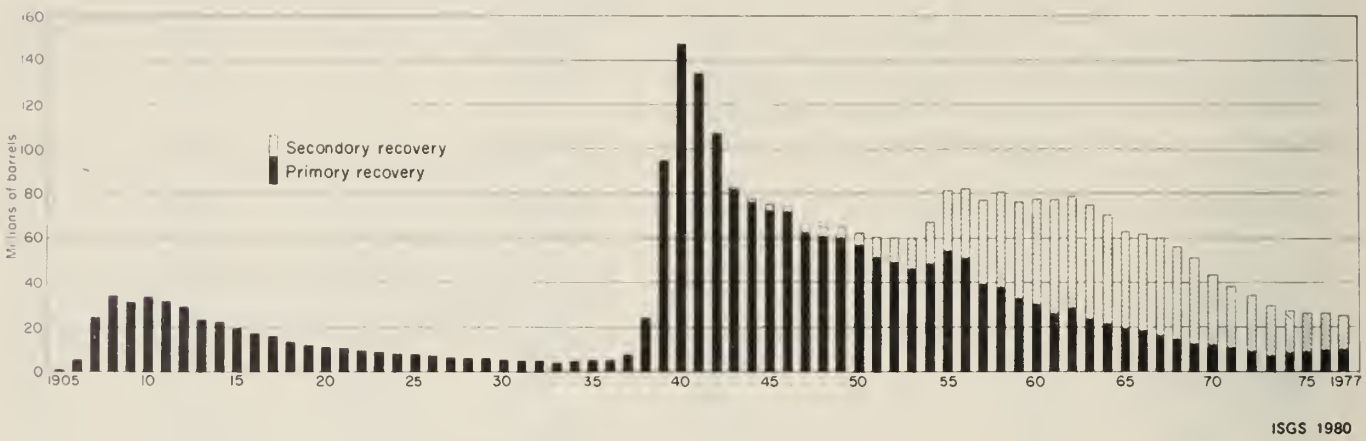

Figure 6. Annual crude oil production in Illinois, 1905-1977.

(84.5 percent of total production); Williamson, 44.2 Mcf (4.4 percent); Bond, 39.8 Mcf (4.0 percent); Saline, 38.9 Mcf (3.9 percent); and Gallatin, 32.4 Mcf (3.2 percent).

Consumption. Natural gas consumption in Illinois totaled 1,167.1 billion cubic feet in 1977, a decrease of 1.7 percent from the 1976 level of 1,187.7 billion cubic feet (table 18). The decline of 6.1 percent in consumption from the 1971 level (figure 7) refects the decreasing supply and increasing price of natural gas rather than a diminished demand. In 1977 the value of natural gas consumed in Illinois was about $2.02 Mcf, compared with $0.76 Mcf in 1971 (a 165.8 percent increase).

Of the total 1,167.1 billion cubic feet of gas consumed in 1977 in Illinois, 98.3 percent (1,147.8 billion cubic feet) was delivered to consumers; the remaining 1.7 percent was lost in extraction, used for pipeline fuel, or burned as lease plant fuel. The consumption of natural gas by consumer class is shown in figure 7. Consumption decreased in all sectors except residential, where consumption was up 2.4 percent from the 1976 level. Electric utilities used 52.8 percent less natural gas than in 1976.

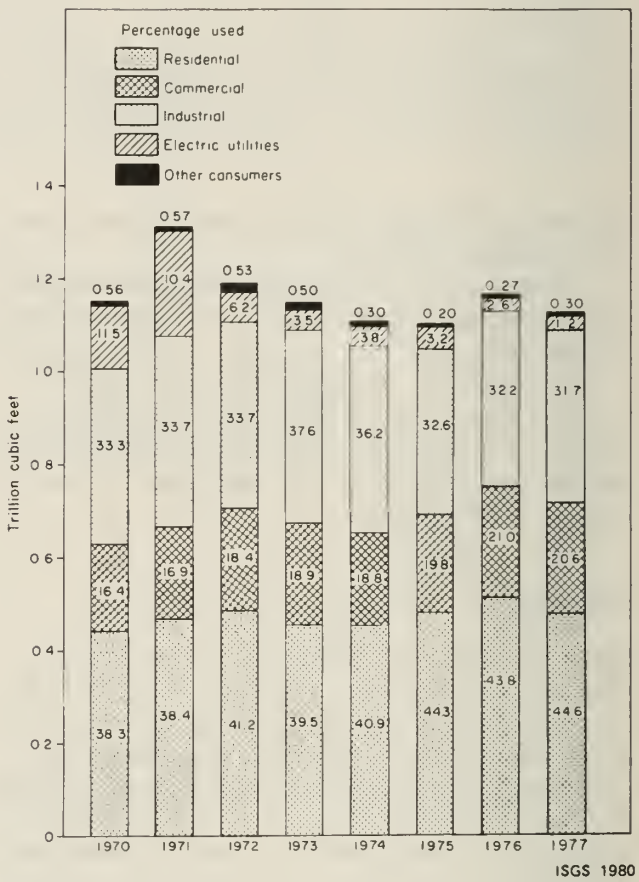

Figure 7. Consumption of natural gas in Illinois, 1970-1977.

Industrial and construction materials

Clays

Production. The types of clay mined in Illinois include common clay, refractory or fire clay, and absorbent clay (fuller's earth). In 1977, a total of 950,380 short tons of clay, excluding fuller's earth, was produced in Illinois. Of this total, 96.2 percent was common clay and the rest was refractory clay. In addition, some absorbent clay (21.6 percent less than in 1976) was produced in Illinois in 1977. At an average-unit value of $5.24 per ton for common clay and $8.96 per ton for refractory clay, the common and refractory clays produced in Illinois were valued at $5,117,809, approximately $1,846,124 more than in 1976. Rising labor, fuel, and material costs contributed to the increased unit value of clay in 1977.

Clay was mined in 11 Illinois counties; the largest amount, 486,245 tons (51.2 percent), was mined in La Salle County. Thirteen companies, with 16 operations in eight counties, produced common clay and shale. Refractory clay was mined at three mines in two counties. Pulaski County, which has two clay-mining companies, continued

to be the only county to produce absorbent clay.

Trends in Illinois clay production are shown in figure 8. Although clay production tends to fluctuate widely from year to year depending on prevailing market conditions, production has been on a generally downward trend since 1968. This trend is not due to slack demand (demand for 1977 shows a small upturn as construction activities increased) but rather to strong competition from out-of-state producers. Increased clay production and favorable transportation and labor costs have enabled producers (particularly those from the southern states) to erode Illinois producers' markets; consequently, Illinois clay production fell in 1977 to its lowest level in more than two decades.

Consumption and uses. The common clays and shales mined in Illinois are used principally in the manufacture of brick, sewer pipe, drain tile, cement, and light-weight aggregates. Of the 0.9 million tons of common clays produced in 1977, 350,008 tons (38.3 percent) were used in the production of building brick; 436,719 tons (47.8 percent) in the production of portland cement, structural concrete, concrete blocks and highway surfacing; and the remaining 127,110 tons (13.9 percent) in the manufacture of sewer pipe and drain tile. No production of gypsum products and terra cotta was reported in 1977.

In 1977 production of clays for common and face brick increased 6.5 percent from the 1976 production level and production of clays for use in cement and concrete products declined 40.3 percent from the 1976 level.

TABLE 18—CONSUMPTION OF NATURAL GAS IN ILLINOIS, BY CONSUMER CLASS, 1976 and 1977

Consumer class	1977 Quantity (million cu ft)	1976 Quantity (million cu ft)	Percentage of change	Percentage of total consumption
Residential	519,973	507,935	+ 2.4	44.6
Commercial	240,520	243,491	- 1.2	20.6
Industrial	369,727	373,424	- 1.0	31.7
Electric utilities	14,430	30,549	- 52.8	1.2
Other consumers[a]	3,166	3,168	- 0.1	0.3
Total delivered to consumers	1,147,816	1,158,567	- 0.9	97.5
Other uses[b]	19,283	29,145	- 33.8	2.5
Total consumption	1,167,099	1,187,712	- 1.7	100.0

[a] Includes municipalities and public authorities that use natural gas for institutional heating, street lighting, and other purposes.
[b] Includes lease and plant fuel, pipeline fuel, and extraction loss.

Source: U.S. Bureau of Mines.

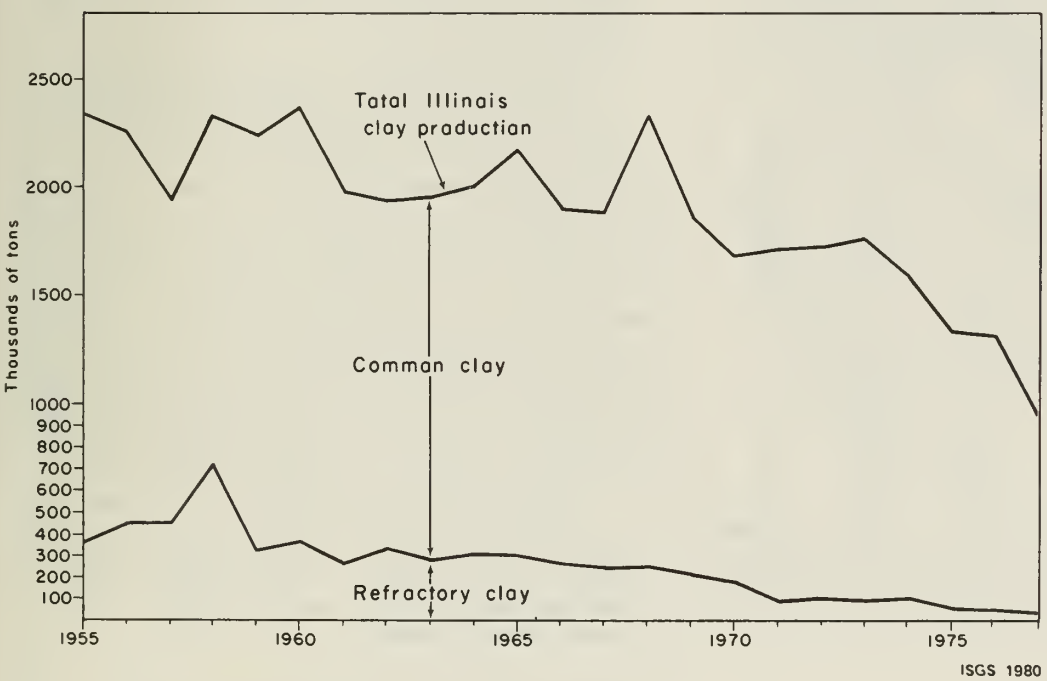

Figure 8. Trends in Illinois clay production, 1955-1977.

TABLE 19—FLUORSPAR SHIPMENTS AND CONSUMPTION, ILLINOIS AND UNITED STATES, 1968-1977

Year	Shipments (tons)					Consumption (tons)		
	Illinois							
	Acid grade	metallurgical grade	Total	United States total	Illinois shipments as percentage of U.S. shipments	Illinois	United States[a]	Illinois consumption as percentage of U.S. consumption
1968	87,152	101,173	188,325	252,411	74.6	64,521	1,243,414	5.19
1969	47,776	40,704	88,480	182,567	48.5	78,727	1,356,624	5.80
1970	86,729	61,479	148,208	269,221	55.1	89,065	1,372,404	6.49
1971	72,514	65,537	138,051	272,071	50.7	89,971	1,344,742	6.69
1972	75,188	57,217	132,405	250,347	52.9	67,428	1,352,149	4.99
1973	93,062	72,751	165,813	248,601	66.7	86,715	1,351,705	6.42
1974	69,204	84,494	153,698	201,116	76.4	75,115	1,524,532	4.93
1975	50,479	49,419	99,898	139,913	71.4	46,525	1,244,938	3.74
1976	91,803	50,863	142,666	188,270	75.8	44,462	1,273,498	3.49
1977	83,758	47,460	131,218	169,500	77.4	43,742	1,162,336	3.76

[a] Fluorspar consumed includes domestic and foreign material.

Source: U.S. Bureau of Mines.

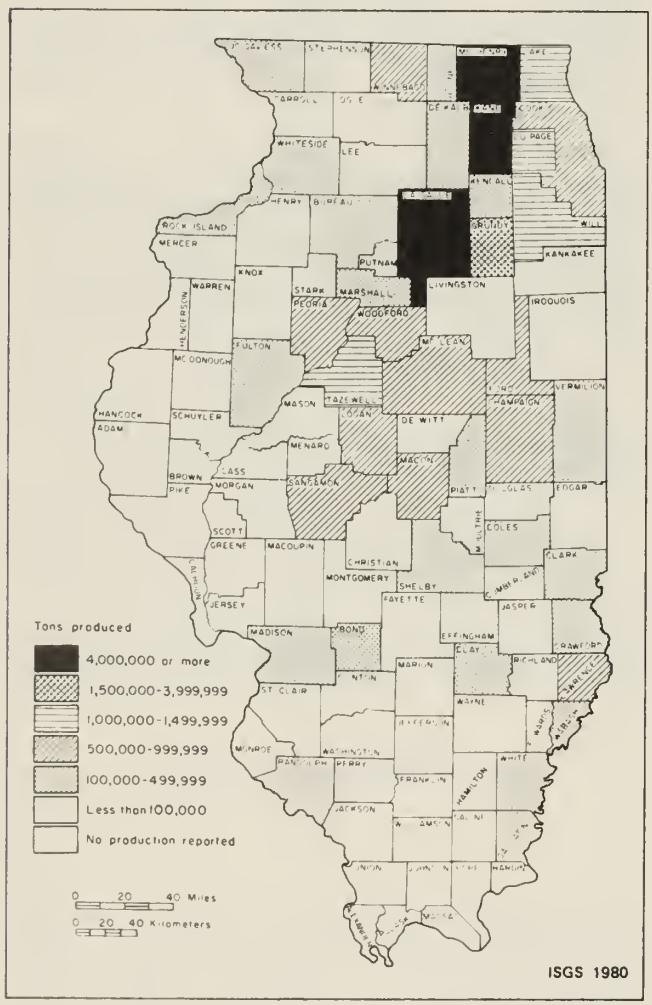

Figure 9. Illinois sand and gravel production by county, 1977. Source: U.S. Bureau of Mines.

Illinois production of refractory clay, used in the manufacture of refractory brick, stoneware, and other clay products, continued its decline, reaching a new low of 36,543 tons in 1977. This was a decline of 28.2 percent from the 1976 level.

Absorbent clay production in Illinois was down 21.6 percent from the 1976 level. Most of the absorbent clay produced in Illinois is used in animal litter and oil and grease absorbents.

Fluorspar

Production. Illinois began producing fluorspar, the state mineral, in 1842 and has continued to do so more or less continuously since that time.

Illinois retained its position as the leading fluorspar-producing state in 1977, contributing 77.4 percent of the nation's total finished fluorspar shipments (table 19). In 1977 Illinois produced 131,218 tons of finished fluorspar. Of the total fluorspar shipped, 83,758 tons were acid grade (more than 97 percent calcium fluoride content) and 47,460 tons were metallurgical grade (less than 85 percent calcium fluoride). Included in these figures are minor amounts of ceramic grade fluorspar (85 to 96 percent calcium fluoride). Total fluorspar shipments from Illinois decreased by 8.0 percent in 1977; this moderate decline was due to market conditions (United States shipments of fluorspar showed a similar decline of 10 percent).

All the fluorspar mined in Illinois in 1977 came from Hardin and Pope Counties. Fluorspar was mined or processed by three companies: Hastie Mining Company, Ozark-Mahoning Company, and the fluorspar division of Allied Chemical Company.

Shipments. Because of its easy access to water, rail, and highway transportation, the Illinois fluorspar industry continues to be successful. In 1977, Illinois producers

shipped 7,044 tons of fluorspar, lead, and zinc to Illinois consumers; 2,819 tons to foreign countries; and 135,168 tons to other states. The latter accounted for 93.2 percent of the total Illinois fluorspar, lead, and zinc shipments.

Consumption. The reported consumption of fluorspar in the United States decreased 8.7 percent from 1,273,498 in 1976 to 1,162,336 in 1977. The apparent U.S. consumption (production + imports - exports ± change in stocks) in 1977 totaled 1,191,000 tons—an increase of 6.2 percent over the 1976 level. This ended the yearly decline reported since the 1.51 million ton peak consumption in 1973.

Illinois fluorspar consumption in 1977 was 43,742 tons or about 3.8 percent of the total U.S. consumption. This represents a continuing decline in Illinois fluorspar consumption. Illinois fluorspar is used as a flux in the production of Illinois raw steel, which totaled 10.9 million tons in 1977—down 1.4 percent from the 1976 level.

The chemical industry is also a large consumer of fluorspar, using it in the production of hydrofluoric acid and, utlimately, of fluorocarbon gases and plastics, sodium and aluminum fluorides for aluminum production, and other miscellaneous chemicals having a wide variety of additional uses. The growing concern over possible damage to the atmosphere which may be caused by fluorocarbons in aerosal sprays and refrigerants has depressed the fluorocarbon market for the past three years and will probably continue to do so in the future.

Sand and Gravel

Production. Sand and gravel deposits are widely distributed throughout Illinois. The principal sources of commercial sand and gravel are glacial deposits, chiefly valley trains and outwash plains. In 1977, Illinois produced 16.6 million tons of sand (excluding industrial sand), 16.7 million tons of gravel (table 20). At a value of $2.05 per ton, Illinois sand and gravel production was valued at $68.4 million, an increase of 10.7 percent over the 1976 level despite a decrease in tonnage.

Illinois ranked second in the nation in the production of industrial sand and gravel in 1977, producing a total of 4.3 million tons. Although production was reported from Bond and La Salle Counties only, a plant is also operating in Ogle County. The 1977 value of industrial sand and gravel was $32.1 million, with a unit value of $7.38 per ton (table 20).

Sixty-one counties produced sand and gravel in 1977 (fig. 9), with 173 companies running 197 operations (as compared with 174 companies running 191 operations in 1976). Total sand and gravel production declined by 1,151,000 tons from the 1976 level (fig. 10). Although the number of sand and gravel operations has been decreasing over the past 15 years, the size of the plants has been increasing. In 1977, 35 plants produced more than 300,000 tons each (table 21); during the mid 1960s, only 25 plants were producing more than 300,000 tons each.

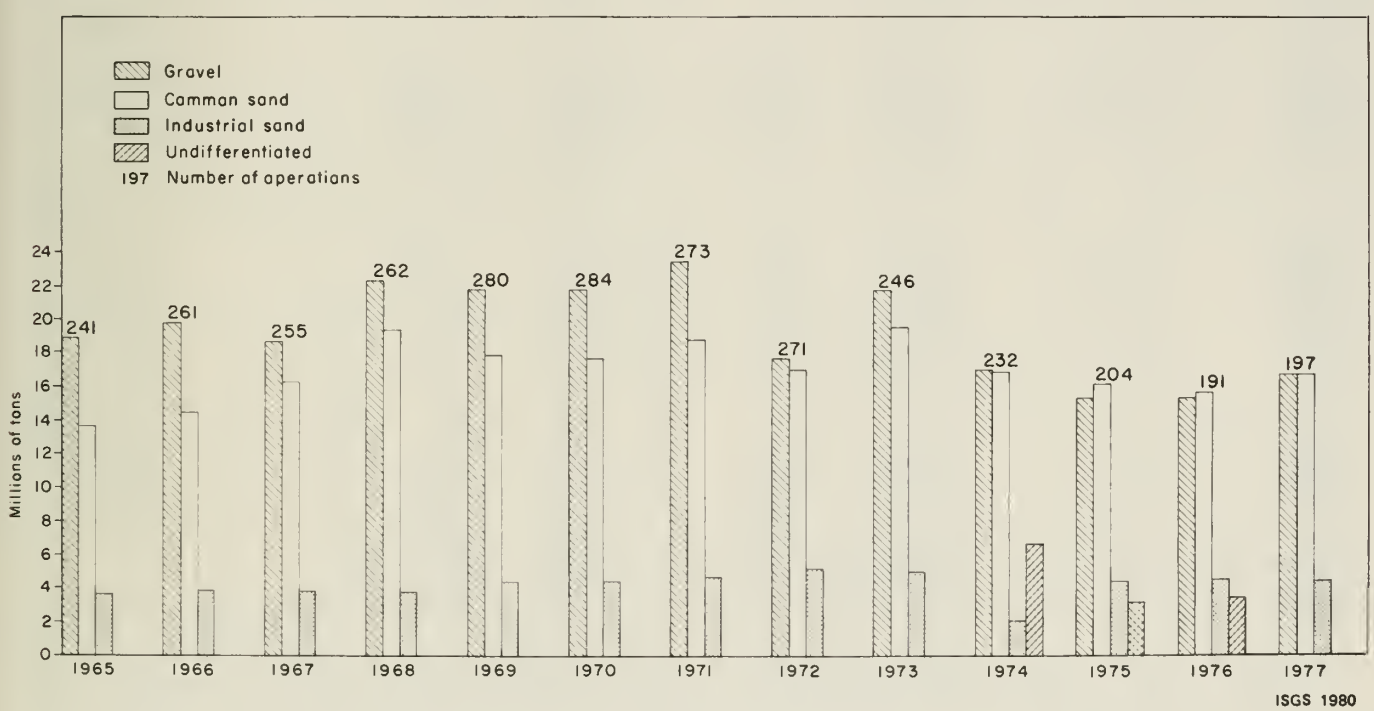

Figure 10. Trends in production of sand and gravel in Illinois, 1965-1977.

TABLE 20—SAND AND GRAVEL PRODUCED AND MODE OF TRANSPORTATION, BY COUNTY, 1977[a]

County	Number of companies	Number of operations	Quantity (1000 tons)					Value ($1000)	Mode of Shipment				
			Sand	Gravel	Industrial sand	Undifferentiated	Total produced		Truck	Rail	Barge	Undistributed	Not reported
Adams	1	1	W[b]	—	—	—	W[b]	W[b]	W[b]	—	—	—	—
Alexander	1	1	W	W	—	—	W	W	W	—	—	W	—
Bond	2	3	W	W	W	—	263	521	W	—	—	W	—
Boone	3	3	183	74	—	—	257	458	179	—	—	19	59
Bureau	5	5	132	182	—	—	315	777	W	—	—	W	10
Champaign	3	4	494	87	—	—	581	1,203	W	—	—	W	—
Clark	3	5	135	361	—	—	496	1,075	110	—	—	386	—
Clay	1	1	78	25	—	—	103	216	103	—	—	—	—
Clinton	2	2	W	2	—	—	W	W	W	—	—	—	—
Coles	2	2	W	W	—	—	W	W	W	—	—	W	—
Cook	2	2	W	W	—	—	W	W	W	—	—	W	—
Crawford	1	1	W	W	—	—	W	W	W	—	—	W	—
Cumberland	2	2	W	W	—	—	W	W	—	—	—	W	W
De Kalb	4	4	W	W	—	—	216	447	W	—	—	W	—
Du Page	3	4	225	975	—	—	1,200	3,032	W	—	—	—	954
Effingham	1	1	W	—	—	—	W	W	W	—	—	—	—
Fayette	1	1	20	30	—	—	50	75	—	—	—	—	50
Ford	5	5	W	W	—	—	W	W	W	—	—	W	—
Fulton	3	3	215	166	—	—	381	747	W	—	—	—	W
Gallatin	1	1	W	W	—	—	W	W	—	—	—	W	—
Grundy	1	1	W	—	—	—	W	W	—	—	W	—	—
Jo Daviess	1	1	W	W	—	—	W	W	W	—	—	W	—
Kane	13	13	1,570	3,019	—	—	4,589	9,504	4,187	—	—	W	W
Kankakee	3	3	26	—	—	—	26	31	26	—	—	—	—
Kendall	2	2	45	71	—	—	116	160	77	—	—	39	—
Lake	6	7	768	533	—	—	1,301	1,851	W	—	—	W	W
La Salle	10	12	W	214	W	—	4,806	33,619	1,310	2,834	—	W	W
Lawrence	3	3	W	W	—	—	700	1,154	W	—	—	W	199
Logan	3	3	357	254	—	—	611	1,263	W	—	—	W	100
McHenry	17	19	3,231	3,817	—	—	7,048	14,049	6,335	W	—	W	562
McLean	4	4	282	471	—	—	753	2,101	W	—	—	W	—
Macon	3	3	W	W	—	—	772	1,573	W	—	—	—	W
Madison	4	4	478	—	—	—	478	896	W	—	W	—	W
Marion	1	1	d	—	—	—	d	d	—	d	—	—	—
Marshall	1	1	W	W	—	—	W	W	W	—	—	W	—
Mason	1	1	W	—	—	—	W	W	W	—	—	—	—
Massac	2	2	1	14	—	—	15	W	15	—	—	—	—
Moultrie	1	1	—	W	—	—	W	W	W	—	—	—	—
Ogle	1	1	—	—	c	—	—	—	—	—	—	—	—
Peoria	4	4	336	493	—	—	829	1,563	W	W	W	W	49
Piatt	2	2	W	W	—	—	W	W	W	—	—	—	—
Pike	1	1	W	W	—	—	W	W	W	—	—	W	—
Pulaski	1	1	—	15	—	—	15	23	15	—	—	—	—
Randolph	1	1	W	—	—	—	W	W	W	—	—	—	—
Rock Island	1	1	W	W	—	—	W	W	—	—	—	—	W
St. Clair	1	2	W	W	—	—	W	W	—	—	—	—	W
Sangamon	4	4	800	185	—	—	985	2,372	726	—	—	76	183
Schuyler	1	1	W	W	—	—	W	W	—	—	—	—	W
Shelby	1	1	W	W	—	—	W	W	W	—	—	W	—
Stark	1	1	W	W	—	—	W	W	—	—	—	W	—
Stephenson	1	1	36	31	—	—	67	165	67	—	—	—	—
Tazewell	4	9	507	524	—	—	1,031	2,555	904	—	—	27	100
Union	2	2	1	12	—	—	13	19	12	—	—	—	1
Vermilion	4	4	47	123	—	—	170	261	—	—	—	119	51
Wabash	4	4	59	44	—	—	103	212	91	—	—	12	—
White	4	4	282	23	—	—	305	597	W	—	—	W	219
Whiteside	2	2	136	50	—	—	186	440	186	—	—	—	—
Will	6	7	397	1,164	—	—	1,561	3,494	1,072	W	—	W	149
Winnebago	7	8	338	512	—	—	850	1,491	154	—	—	W	W
Woodford	4	4	326	625	—	—	951	2,566	920	—	—	W	—
Concealments			5,123	2,562	—	—	5,490	10,720	6,088	166	1,954	4,920	2,772
State total	173	197	16,628	16,658	4,347	—	37,633	101,230	22,577	3,000	1,954	5,598	4,504

[a] Includes government operations.
[b] W=withheld included in concealments.
[c] Industrial sand production not reported, but a plant was operating in Ogle County.
[d] Under both 1,000 tons and dollars.

Source: U.S. Bureau of Mines.

TABLE 21—ILLINOIS SAND AND GRAVEL PRODUCTION, BY SIZE OF OPERATION, 1976 AND 1977

Size of operation (tons per year)	1977			1976		
	Number of operations	Production (1000 tons)	Percentage of commercial production	Number of operations	Production (1000 tons)	Percentage of commercial production
less than 25,000	50	484	1.3	48	521	1.3
25,000 to 49,999	26	957	2.4	27	953	2.5
50,000 to 99,999	30	1,994	5.3	27	1,895	4.9
100,000 to 199,999	41	5,988	15.9	37	5,312	13.7
200,000 to 299,999	16	3,851	10.2	14	3,328	8.6
300,000 to 399,999	13	4,424	11.8	12	4,146	10.7
400,000 to 499,999	5	2,231	5.9	3	1,350	3.5
500,000 to 599,999	2	W	W	5	2,738	7.1
600,000 to 699,999	4	2,538	6.7	5	3,272	8.4
700,000 to 799,999	1	W	W	2	1,453	3.7
800,000 to 899,999	2	W	W	4	3,430	8.8
900,000 to 999,999	1	W	W	1	929	2.4
1,000,000 and over	7	10,655	28.3	6	9,457	24.4
Total	198	37,633	100.0	191	38,784	100.0

W - Withheld to avoid disclosing confidential data but included in total.
Source: U.S. Bureau of Mines.

TABLE 22—ILLINOIS SAND AND GRAVEL SOLD OR USED BY PRODUCER, BY CLASS OF OPERATION AND USE, 1976 AND 1977

Class of operation and use	1977		1976		Change in quantity from 1976 to 1977 (%)	Change in value from 1976 to 1977 (%)
	Quantity (1000 tons)	Value ($1000)	Quantity (1000 tons)	Value ($1000)		
Construction aggregates						
Sand and gravel						
Commercial operations						
Building	12,947	30,292	10,466	20,829	+ 23.71	+ 45.43
Paving	7,719	14,769	10,184	17,281	- 24.20	- 14.54
Fill	4,230	5,646	3,644	5,259	+ 16.08	- 7.36
Other uses[a]	356	738	340	578	+ 4.71	+ 27.68
Total[b]	25,252	51,444	24,634	43,947	+ 2.51	+ 17.06
Government and contractor						
Building	2,143	5,380	806	1,517	+165.88	+254.65
Paving	5,109	10,274	7,788	14,613	- 34.40	- 29.69
Fill	746	1,182	984	1,534	- 24.19	- 25.38
Other uses	37	74	88	98	- 57.95	- 24.49
Total[b]	8,034	16,909	9,666	17,812	- 16.88	- 5.07
Industrial sand						
Blast	d	d	147[d]	890[d]	d	d
Molding	1,215	9,155	1,238	6,131	- 1.86	+ 49.32
Glass	1,916	8,821	1,939	9,565	- 1.19	- 7.78
Other uses[c]	1,216	14,902	1,160	8,807	- 7.00	+ 53.68
Total[b]	4,347	32,878	4,484	25,393	- 3.06	+ 29.48
Total sand and gravel	37,633	101,230	38,784	87,152	- 2.97	+ 16.15

[a] Includes railroad ballast.
[b] Numbers are rounded and totals may not necessarily add up.
[c] Includes engine, filtration, foundry use, grinding and polishing, oil hydrofrac, pottery, abrasives, chemicals, enamel, and other uses.
[d] Included with other uses to conceal for 1977; blast and other uses added together for 1976 for percent change.
[e] Some industrial grave included for 1977. Source: U.S. Bureau of Mines.

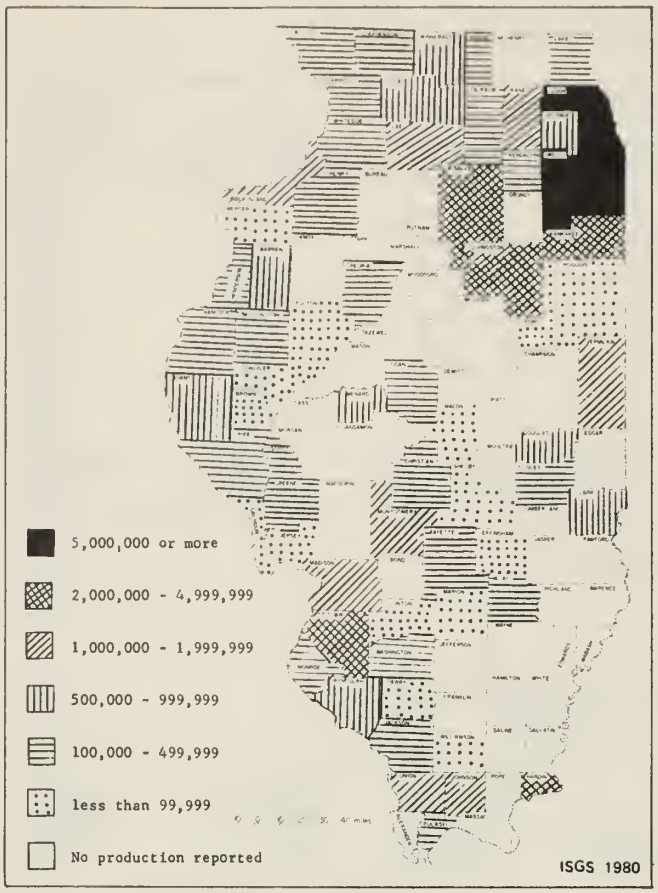

Figure 11. Illinois stone production by county, 1977. Source: U.S. Bureau of Mines.

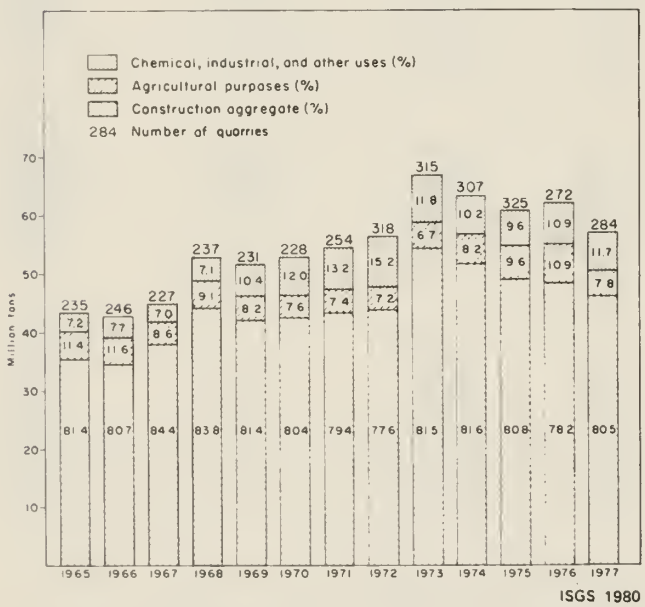

Figure 12. Trends in uses of crushed and broken stone produced in Illinois, 1965-1977.

Transportation. Sand and gravel is usually not shipped farther than 50 miles from the pit. In 1977 trucks moved approximately 60 percent of the total shipments; barges, 5.2 percent; and railroads, 8 percent; 14.8 percent was undistributed and approximately 12 percent not reported (table 20).

Consumption and uses. Common sand and gravel produced in Illinois is used primarily in construction aggregates. Of the 33.3 million tons of common sand and gravel produced in 1977, 75.9 percent was used in commercial operations and 24.1 percent in government and contractor operations (table 22). Sand and gravel used in commercial operations decreased by 2.5 percent in quantity but increased 17.1 percent in value; sand and gravel used for government and contractor operations decreased by 16.9 percent in quantity and 5.1 percent in value. A total of 15.1 million tons (45.3 percent) was used for building construction; 12.8 million tons (38.6 percent) for paving; and 5.4 million tons (16.1 percent) for fill and other uses (table 22).

Industrial sand produced in 1977 was sold in unground form (91.0 percent of total industrial sand) for use in glass manufacturing; as molding, blasting, grinding, and polishing sand; as engine sand for filtration; and as sand for hydrofracturing in oil wells. Ground sand (9.0 percent of total) was sold for use in chemicals, abrasives, enamels, glass, pottery, porcelain, and tile for fillers and foundry purposes.

Stone

Production. Illinois stone production (excluding dimension stone) decreased from 61.9 million tons in 1976 to 57.1 million tons in 1977, a 7.7 percent loss. The total value also declined to $136.0 million, even though the average unit value rose from $2.29 per ton in 1976 to $2.38 per ton in 1977.

Of the 57.1 million tons of crushed and broken stone produced in 1977, 35.7 million tons were limestone and 21.4 million tons were dolomite (table 23). In addition to crushed and broken stone, Illinois produced a small amount of dimension stone (stone quarried and prepared in blocks to specifications) at one quarry in Kane County. According to the U.S. Bureau of Mines, 2,545 tons of dimension stone valued at $108,904 were produced in Illinois in 1977.

As figure 11 shows, 64 Illinois counties reported stone production in 1977 (six more than in 1976), and 284 limestone or dolomite quarries were operating in 1977 as compared with 272 in 1976. In 1977, in contrast to the past several years, the gain was in the number of small, rather than large, quarries—there were 183 quarries producing less than 100,000 tons per year in 1977 as compared with 160 in 1976. The number of quarries producing between 100,000 and 500,000 tons per year declined from 83

TABLE 23—PRODUCTION AND VALUE OF ILLINOIS STONE, BY COUNTY AND MODE OF TRANSPORTATION, 1977

County	Number of Quarries	Crushed and broken: Limestone (tons)	Crushed and broken: Oolomite (tons)	Production**: Tons	Production**: Value ($)	Mode of transportation: Truck (tons)	Mode of transportation: Rail (tons)	Mode of transportation: Barge (tons)	Mode of transportation: Unspecified (tons)
Adams	6	862,366	—	862,366	7,054,033	544,777	317,589	—	—
Boone	3	—	W	W	W	W	—	—	—
Brown	1	W	—	W	W	W	—	—	—
Calhoun	2	W	—	W	W	W	—	W***	—
Carroll	7	177,719	—	177,719	410,200	177,719	—	—	—
Christian	2	W	—	W	1,289,938	W	—	—	—
Clark	2	528,940	—	528,940	1,839,526	528,940	—	—	—
Clay	2	W	—	W	W	W	—	—	—
Clinton	2	W	—	W	W	W	—	—	—
Coles	1	W	—	W	1,698,423	W	—	—	—
Cook	5	W	W	15,731,210	32,618,746	15,396,412	334,798	—	—
De Kalb	2	W	W	W	W	W	—	—	—
Douglas	1	505,394	—	505,394	1,591,956	505,394	—	—	—
Du Page	1	—	W	W	W	W	—	—	—
Effingham	1	649	—	649	3,245	649	—	—	—
Fayette	2	W	—	W	W	W	—	—	—
Ford	1	419	—	419	913	419	—	—	—
Fulton	1	800	—	800	2,000	800	—	—	—
Greene	3	W	—	W	W	W	—	—	—
Hancock	3	297,000	—	297,000	761,000	297,000	—	—	—
Hardin	5	2,151,377	—	2,151,377	4,247,478	1,251,377	—	900,000	—
Henderson	4	371,345	—	371,345	1,043,332	371,345	—	—	—
Henry	1	W	—	W	W	W	—	—	—
Iroquois	1	W	—	W	W	W	—	—	—
Jackson	1	211,837	—	211,837	W	211,837	—	—	—
Jersey	2	W	—	W	W	W	—	—	—
Jo Daviess	14	W	W	261,555	344,500	261,555	—	—	—
Johnson	2	W	—	W	W	W	W	—	—
Kane	3	1,043,220	—	1,043,220	2,521,367	1,043,220	—	—	—
Kankakee	5	W	W	W	W	W	W	—	—
Kendall	1	—	W	W	W	W	—	—	—
Lake	1	156,755	—	156,755	391,888	156,755	—	—	—
La Salle	6	2,132,214	—	2,132,214	4,235,650	1,495,502	—	—	636,712
Lee	9	W	W	1,336,810	2,535,033	1,336,810	—	—	—
Livingston	6	2,822,783	—	2,822,783	8,017,496	2,822,783	—	—	—
Logan	1	W	W	W	W	W	—	—	—
McDonough	2	W	—	W	W	W	—	—	—
Macon	1	1,075	—	1,075	1,985	1,075	—	—	—
Madison	3	1,066,642	—	1,066,642	3,071,926	1,066,642	—	—	—
Marion	2	W	—	W	W	W	—	—	—
Menard	2	W	—	W	W	W	—	—	—
Mercer	1	9,377	—	9,377	26,256	9,377	—	—	—
Monroe	2	W	—	W	W	W	W	—	—
Montgomery	5	1,625,386	—	1,625,386	4,302,242	1,625,386	—	—	—
Ogle	15	W	W	885,917	1,962,600	885,917	—	—	—
Peoria	1	260,428	—	260,428	716,855	260,428	—	—	—
Perry	1	60,000	—	60,000	102,000	60,000	—	—	—
Pike	5	357,982	—	357,982	852,521	357,982	—	—	—
Pulaski	1	W	—	W	W	W	W	—	—
Randolph	2	W	—	W	W	W	—	—	—
Rock Island	4	W	—	W	W	W	—	—	—
St. Clair	5	2,034,152	—	2,034,152	4,512,584	2,034,152	—	—	—
Schuyler	1	W	—	W	W	W	—	—	—
Scott	2	W	—	W	W	W	—	—	—
Shelby	1	W	—	W	W	W	—	—	—
Stephenson	9	257,454	—	257,454	517,719	257,454	—	—	—
Union	2	W	—	W	W	W	—	—	—
Vermilion	2	W	—	W	W	W	—	—	—
Warren	3	741,125	—	741,125	1,682,642	741,125	—	—	—
Washington	2	W	—	W	W	W	—	—	—
Whiteside	4	W	—	W	W	W	—	—	—
Will	8	W	W	5,328,075	10,867,559	3,356,920	234,155	1,737,000	—
Williamson	1	54,900	—	54,900	151,490	54,900	—	—	—
Winnebago	19	W	W	877,324	1,686,792	877,324	—	—	—
Undistributed*	68	600,002	—	600,002	1,310,086	600,002	—	—	—
Concealed totals		17,416,561	21,335,301	14,330,971	33,618,287	13,641,706	679,888	—	—
Totals	284	35,738,525	21,335,301	57,073,826	135,964,012	52,233,684	1,566,430	2,637,000	636,712

W = Withheld to avoid disclosing confidential data of individual companies; included in total.
* County location not reported by producer.
** Excludes dimension stone.
*** Included with railroad to avoid disclosing confidential data.
Source: U.S. Bureau of Mines.

in 1976 to 75 in 1977, while the number of quarries producing more than 500,000 tons per year decreased from 29 in 1976 to 26 in 1977. Illinois stone production by size of operation is shown in table 24.

Shipment. Because the hauling distance is short, most stone is shipped by truck. Shipment of stone, a bulk commodity, is confined primarily to areas near the quarry. Some producers, particularly those in Will and Hardin Counties, are located where they can make good use of the Illinois waterways. As shown in table 23, 91.5 percent (52.2 million tons) of the state's total production of 57.1 million tons was shipped by truck in 1977. Other modes of shipment included rail (1.6 million tons) and barge (2.6 million tons).

Consumption and uses. Stone produced in Illinois is sold for construction aggregate, for agricultural purposes, and for industrial and chemical use (fig. 12). Specific uses of stone produced in Illinois are shown in table 25.

In 1977, of the 57.1 million tons of stone produced in Illinois, 45.9 million tons (80.4 percent) were used for construction aggregate. Of the total, 31.9 percent (14.7 million tons) was used for road base stone; 20.4 percent (9.4 million tons) for concrete aggregate; 8.8 percent (4.0 million tons) for surface treatment aggregate; 12.1 percent (5.6 million tons) for bituminous aggregate; 6.2 percent (2.8 million tons) for macadam aggregate; and 20.5 percent (9.4 million tons) for unspecified construction aggregate (table 25).

Illinois used 4.5 million tons of stone—chiefly limestone—for agricultural purposes in 1977. This represents 7.8 percent of the total amount of stone produced. Illinois ranks among the top states in consumption of limestone for agricultural purposes, according to the National Lime Association, and primarily to supply this large market, has become one of the leading producers of agstone and ground limestone for agricultural purposes.

Illinois used 6.7 million tons of stone (11.7 percent of the 1977 total) for industrial, chemical, and other uses. High calcium limestone, usually containing more than 95 percent CaO, was used in the manufacture of cement and lime, in the manufacture of iron and steel (as fluxstone), in rock-dusting mines, and in various chemical industries.

In 1977, 57.2 percent of the dimension stone produced in Illinois was used as veneer in house construction. A sharp drop in the amount of dimension stone used as flagstone was reported: from 87 percent in 1976 to 42.8 percent in 1977.

Tripoli (amorphous silica)

Production. The term "tripoli" refers to several fine-grained, porous, siliceous materials mined in four states: tripoli is produced in Arkansas and Oklahoma; amorphous, or soft, silica is mined in Illinois; and rottenstone is produced in Pennsylvania. Illinois has been the nation's largest producer of these siliceous materials in recent years, accounting for about 63.4 percent of the total United States production in 1977.

In 1977, amorphous silica was produced from two mines in Alexander County by two companies—the Illinois Minerals Company and Tommsco, Inc. The value of crude tripoli production increased about 6.7 percent, while the quantity increased 6.4 percent over the 1976 levels. Most of Illinois production was processed in the state.

Consumption and uses. The amorphous silica processed in Illinois was used for abrasives and filler. From 1976 to 1977, the percentage of finished abrasive material decreased from 60.4 percent to 48.4 percent, while that sold for filler increased from 35.3 percent to 51.6 percent.

TABLE 24—ILLINOIS STONE PRODUCTION BY SIZE OF OPERATION, 1976 AND 1977[a]

Size of operation (tons per year)	Number of quarries	1977 Production (tons)	Percentage of total	Number of quarries	1976 Production (tons)	Percentage of total
Less than 25,000	131	1,344,916	2.4	109	1,399,400	2.3
25,000 to 49,999	26	994,562	1.7	23	825,549	1.3
50,000 to 74,999	15	921,539	1.6	21	1,288,853	2.1
75,000 to 99,999	11	938,990	1.7	7	620,839	1.0
100,000 to 199,999	23	3,275,510	5.7	40	5,774,753	9.3
200,000 to 299,999	33	7,974,003	14.0	20	4,990,633	8.1
300,000 to 399,999	10	3,361,536	5.9	17	5,664,780	9.2
400,000 to 499,999	9	4,076,227	7.1	6	2,672,963	4.3
500,000 to 599,999	7	3,708,056	6.5	5	2,729,144	4.4
600,000 to 699,999	5	3,145,776	5.5	8	5,024,089	8.1
700,000 to 799,999	2	1,473,411	2.6	3	2,384,061	3.9
800,000 to 899,999	3	2,498,769	4.4	1	823,206	1.3
900,000 and over	9	23,360,532	40.9	12	27,659,995	44.7
TOTAL	284	57,073,826	100.0	272	61,858,265	100.0

[a] Excludes dimension stone.

Source: U.S. Bureau of Mines.

TABLE 25—USE OF CRUSHED AND BROKEN STONE PRODUCED IN ILLINOIS, 1977

Use	Limestone (tons)	Dolomite (tons)	Total (tons)	Percentage of total	Percentage of change from 1975	Average value per ton
Road base stone	10,469,062	4,181,818	14,650,880	25.7	- 15.4	2.33
Concrete aggregate	6,105,015	3,278,974	9,383,989	16.4	- 10.2	2.34
Surface treatment aggregate	1,607,373	2,422,908	4,030,281	7.1	+ 2.6	2.26
Bituminous aggregate	2,156,547	3,414,134	5,570,681	9.8	- 16.6	2.34
Unspecified construction	5,815,228	3,613,720	9,428,948	16.5	+ 42.6	2.19
Agricultural purposes[a]	3,878,916	599,252	4,478,168	7.8	- 33.8	2.76
Cement	3,065,404	—	3,065,404	5.4	+ 6.2	1.80
Macadam aggregate	1,150,279	1,685,761	2,836,040	5.0	- 15.7	2.23
Flux stone	W[bc]	W[bc]	W[bc]			1.95
Riprap & jetty	418,190	124,238	542,428	1.0	- 30.4	2.32
Railroad ballast	110,776	528,869	639,645	1.1	- 1.2	2.12
Other uses[d]	961,734	1,485,628	2,447,362	4.2	+ 0.5	4.56
Total	35,738,524	21,335,302	57,073,826	100.0	- 7.7	2.38

[a] Includes agricultural limestone and poultry grit.
[b] W = Withheld to avoid disclosing confidential data of individual companies; included in total.
[c] Included with other uses.
[d] Includes stone for asphalt filler, chemicals, lime manufacture, mine dusting, filler, roofing aggregate, fill, waste material, whiting, other uses, and flux stone.
Source: U.S. Bureau of Mines.

Metals

Zinc, lead, silver, and germanium

Production. During 1977 the metals recovered from ore mined in Illinois—zinc, lead, silver, and germanium—were recovered from fluorspar ore mined in Hardin and Pope Counties by the Allied Chemical Corporation and the Ozark-Mahoning Company. Zinc production was up 9.5 percent, lead production was up 2.1 percent, and silver production was up 64.2 percent in 1977. The value of zinc production increased 1.8 percent; that of lead, 34.4 percent; and that of silver, 74.3 percent. Germanium has been produced off and on over the last few years in very small amounts. Production data are not available for germanium, and actual production figures for zinc, lead, and silver are withheld to avoid disclosing individual company data.

Other minerals

Other minerals mined in Illinois include peat, gemstones, and primary barite.

Peat

Although peat is classified as a fuel by the U.S. Bureau of Mines, virtually all commercial sales of peat in the United States (excluding imports) are for agricultural and horticultural purposes—specifically, for soil improvement. Three major kinds of peat—reed-sedge, moss, and peat humus—were produced in Illinois.

In 1977 Illinois ranked third, after Michigan and Florida, among the 22 peat-producing states and accounted for 10.24 percent of the nation's total peat production. Five companies produced 80,355 tons of peat and six companies sold peat valued at $1,478,000 (table 26). Peat production, which decreased 5.5 percent during 1977, occurred in Whiteside, Kane, Cook, and Lake Counties.

TABLE 26—PRODUCTION AND COMMERCIAL SALES OF PEAT IN ILLINOIS, 1970-1977

Year	Number of plants	Production (tons)	Commerical sales (tons)	Value ($)	Average value per ton ($)	Illinois production (%)[a]
1970	6	62,990	63,341	711,000	11.23	12.19
1971	7	72,523	71,823	W[b]	W[b]	12.03
1972	5	69,523	74,003	W[b]	W[b]	12.06
1973	6	71,552	71,551	1,037,000	14.49	11.28
1974	6	95,807	95,807	1,412,000	14.74	13.11
1975	6	96,295	95,719	1,511,401	15.79	12.48
1976	4	84,662	87,087	763,000	8.76	8.73
1977	6	80,355	82,356	1,477,595	17.94	10.24

[a] Illinois production as percentage of United States production.
[b] W = Withheld to avoid disclosing data from individual companies.

Source: U.S. Bureau of Mines.

Gemstones

Fluorspar, the gemstone produced in Illinois, contributed very little to the total value of mineral production. The 1977 estimated value of gemstones remained the same as for 1976—approximately $2,000.

Primary barite

Beginning in 1974, primary barite was produced in Illinois in minor amounts as a by-product of the fluorspar industry.

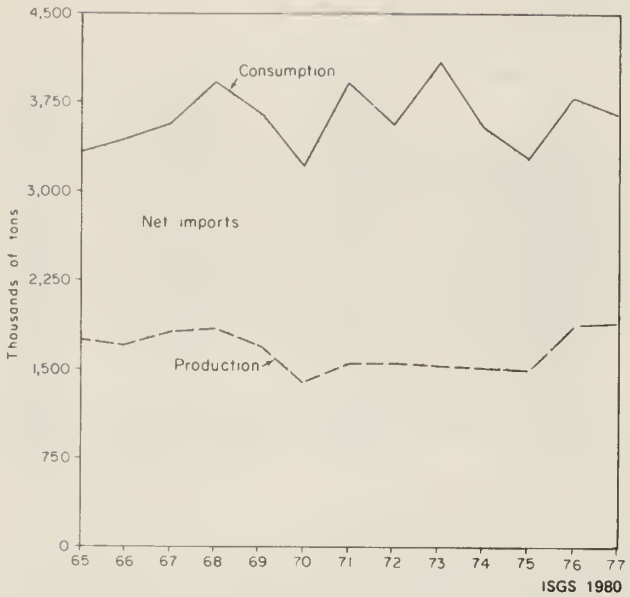

Figure 13. Production and consumption of finished portland cement in Illinois, 1965-1977.

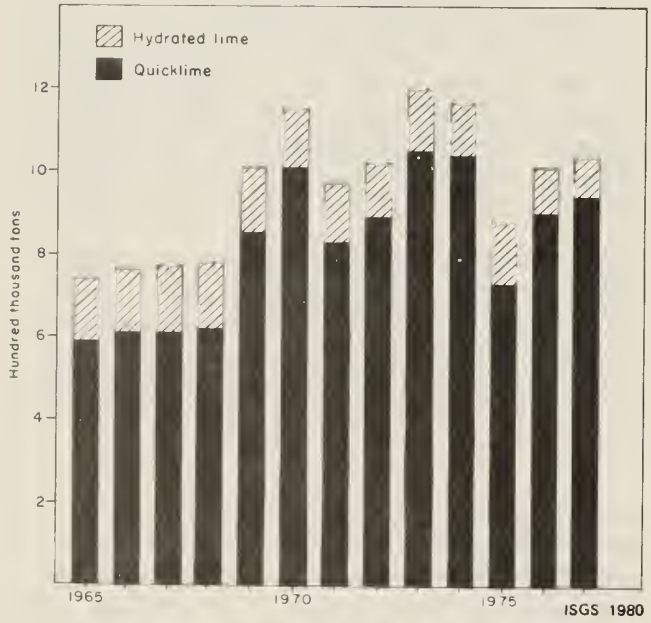

Figure 14. Trends in consumption of quicklime and hydrated lime in Illinois, 1965-1977. Source: U.S. Bureau of Mines.

The production of primary barite and its value increased in 1977. In 1977, Allied Chemical Corporation and Ozark-Mahoning Company produced barite flotation concentrates as a by-product in Hardin County. Barite is used primarily as a weighting agent in drilling muds, and is also used in the manufacture of paint, glass, and rubber and in the production of barium chemicals.

MINERAL MATERIALS PROCESSED

Mineral materials produced mainly in other states and foreign countries but processed in Illinois in 1977 included ground barite, bismuth, columbium and tantalum, calcined gypsum, crude iodine, iron oxide pigments, natural gas liquids, expanded perlite, pig iron, sulfur, exfoliated vermiculite, primary slab zinc, and secondary slab zinc.

Ground barite

Ground barite was produced in East St. Louis, St. Clair County by Mineral Pigments and Metals Division of Pfizer, Inc. The 1977 production and value increased slightly, by 14.8 and 9.2 percent, respectively. The ground barite produced in Illinois is used almost exclusively as a filler or extender in paint.

Bismuth

A small quantity of bismuth was recovered by recycling secondary material at the United Refining and Smelting Company, Franklin Park, Cook County. Bismuth is used in fusible alloys, in pharmaceutical chemical applications, and as a metallurgical additive. Production figures are not available.

Columbium and tantalum

Processing of columbium-tantalum concentrate imported from foreign countries was reported by Fansteel, Inc. of Chicago. Fansteel produced columbium, tantalum metal, and tantalum carbide. Columbium and tantalum are used primarily in the production of various steel alloys. Production figures are not available.

Calcined gypsum

Gypsum imported from out-of-state mines was calcined at Waukegan, Lake County by the National Gypsum Company. In 1977, the quantity of gypsum calcined was 9.1 percent higher, and the value 32.2 percent higher, than in 1976.

Crude iodine

Crude iodine was processed for commercial use at two plants in 1977: Abbott Laboratories in North Chicago, Lake County, and Economics Laboratory, Inc. in Joliet, Will County. Both organic and inorganic compounds were produced. Consumption of crude iodine increased 170.4 percent over 1976. Iodine is used primarily as a catalyst or stabilizer, or in animal feed, inks, colorants, pharmaceuticals, and sanitary and industrial disinfectants.

Iron oxide pigments

Illinois plants processed 39,253 tons of iron oxide pigments, valued at $18.1 million, in 1977, a decrease in both quantity and value from 1976. The finished pigments were produced from iron ore imported from other states by the Prince Manufacturing Company of Quincy in Adams County; George B. Smith Chemical Works of Maple Park in Kane County; Pfizer, Inc., of East St. Louis in St. Clair County; and Solomon Grinding Service of Springfield in Sangamon County. Pigments produced by these companies included 16,537 tons of natural red iron oxides valued at $1.5 million as well as natural brown iron oxides and synthetic iron oxides.

Natural gas liquids

Natural gas liquids include ethane, propane, isobutane, unsplit butane, and a combination of gasoline and liquefied petroleum gas (LPG). Natural gas was processed in 1977 in Douglas County at the Tuscola plant of the United States Industrial Chemical Company, a division of National Distillers and Chemical Corporation.

Expanded perlite

Crude perlite mined outside the state was processed by Silbrico Corporation in Cook County; Mica Pellets, Inc., in DeKalb County; Filter Products Corporation (purchased by Korhumel Industries, Inc. in November, 1976) and National Gypsum Company, both in Lake County; and Johns-Manville Sales Corporation in Will County. Expanded perlite is used primarily as an aggregate for concrete and plaster, for horticultural aggregate, for roof insulating board, for low-temperature insulation, and for aid in filtering. Perlite production in 1977 increased by 9.3 percent over 1976, with an increase in value of 23.2 percent.

TABLE 27—PRODUCTION AND VALUE OF CEMENT MANUFACTURED IN ILLINOIS, 1976 AND 1977

	Finished portland cement			Prepared masonry cement		
	1977	1976	Percentage of change from 1976 to 1977	1977	1976	Percentage of change from 1976 to 1977
Number of active plants	4	4	—	—	2	—
Production (tons)	1,915,000	1,848,575	+ 3.6	*	74,277	—
Shipment from mills						
Quantity (tons)	1,823,000	1,631,812	+ 11.7	*	74,385	—
Value	$61,849,000.00	$53,524,021.00	+ 15.6	*	$4,356,444.00	—
Average value per ton	$33.93	$32.80	+ 3.4	*	$58.57	—
Stocks at mills, Dec. 31 (tons)	187,000	287,246	+ 34.9	*	10,450	—

Source: U.S. Bureau of Mines.

* Information must be withheld to avoid disclosing individual company confidential data.

TABLE 28—PRODUCTION AND CONSUMPTION OF COKE IN ILLINOIS, BY USE, 1976-1977
(1000 tons)

		Coke uses (1000 tons)						
Year	Coke production	Blast furnace	Foundry	Other industrial plants	Residential heating	Total coke consumption[a]	Breeze production	Total breeze consumption
1973	1,941	3,610	204	28	1	3,843	223	241
1974	1,912	2,867	213	32	—[b]	3,112	212	365
1975	1,924	2,954	148	19	—[b]	3,122	251	334
1976	1,706	3,356	174	7	—[b]	3,537	270	319
1977	1,591	3,496	177	30	—[b]	3,703	762	216

[a] Data may not add to totals shown because of independent rounding.

[b] Included with "Other industrial plants."

Source: U.S. Bureau of Mines.

Pig iron and raw steel

During 1977, 6.2 million tons of pig iron valued at $1,155.9 million were produced in blast furnaces in Illinois, representing a 3.1 percent decrease in production and a 3.2 percent increase in value from 1976 levels. Illinois is one of the nation's leading steel-producing states, ranking fourth in 1977. Four of the five Illinois steel plants are located in Cook County—Interlake Steel Company, International Harvester Company's Wisconsin Steel Division, United States Steel Corporation, and Republic Steel Corporation. The fifth plant, Granite City Steel Division of National Steel Corporation, is in Madison County. According to the American Iron and Steel Institute in Washington, D.C., 10.9 million tons of raw steel (nearly 9 percent of the United States output) were produced in Illinois in 1977, a decrease of 1.4 percent from the 1976 level of 11.0 million tons.

Recovered elemental sulfur

During 1977, elemental sulfur was recovered by six companies operating eight plants: Union Oil Company of California at its Chicago plant in Cook County; Marathon

TABLE 29—QUANTITY AND VALUE OF COKE AND BY-PRODUCTS PRODUCED, SOLD, OR USED BY PRODUCER IN ILLINOIS, 1976 AND 1977

Coke and by-products	Unit	1977 Quantity	1977 Value at plant Total ($1000)	1977 Value at plant Average ($ per ton)	1976 Quantity	1976 Value at plant Total ($1000)	1976 Value at plant Average ($ per ton)
Plants in operation		4.00			4.00		
Coal, carbonized	thousand tons	2,470.00	104,456	42.29	2,771.00	106,625	38.48
Coal per ton of coke	tons	1.55	—	65.55	1.62	—	62.34
Coke produced	thousand tons	1,591.00	164,303	103.27	1,706.00	160,961	94.35
Coke yield, percent of coal carbonized	percent	64.41			61.57	—	—
Source of coal carbonized							
Illinois	thousand tons	868.00			982.00	—	—
Kentucky	thousand tons	928.00			960.00	—	—
West Virginia	thousand tons	588.00			638.00	—	—
Pennsylvania	thousand tons	89.00			20.00	—	—
Virginia	thousand tons	220.00			122.00	—	—
Oklahoma	thousand tons	6.00			—	—	—
Total	thousand tons	2,699.00			2,722.00	—	—
From stock or to stock	thousand tons	229.00			49.00	—	—
Coke sold or used by producer							
Blast furnace	thousand tons	1,551.00	140,300		1,751.00	138,657	—
Other purposes	thousand tons	W	W		W	W	—
Commercial sales							
Blast furnaces	thousand tons	W	W		W	W	—
Other industrial plants	thousand tons	—	—		—	—	—
Residential	thousand tons	—	—		—	—	—
Coke over by-products							
Ammonia produced (sulfate equivalent)	thousand tons	16.00	—		15.00	—	—
Per ton of coal coked	lb	12.72	—		11.16	—	—
Sulfate equivalent sold	thousand tons	15.00	650		21.00	874	—
Coke oven gas produced	million cu ft	24,733.00	—		29,204.00	—	—
Per ton of coal	thousand cu ft	10.01	—		10.54	—	—
Used in heating coke ovens	million cu ft	9,930.00	—		12,170.00	—	
Surplus used or sold	million cu ft	13,255.00	13,066	0.986/Mcf	15,455.00	10,388	0.672/Mcf
Wasted	million cu ft	1,548.00			1,578.00	—	
Light oil and derivatives sold	thousand gal	5,474.00			6,693.00	—	
Tar produced	thousand gal	15,276.00			16,991.00	—	
Per ton of coal coked	gal	6.18			6.13	—	
Used by producers	thousand gal	W			W	—	
Sold for refining	thousand gal	11,574.00	3,752	0.324/gal	41,678	13,393	0.321/gal
Total coke and by-products sold or used (excluding light oil and derivatives sold)			181,771			185,616	

[a] W - Withheld to avoid disclosure of data from individual companies.
Source: U.S. Bureau of Mines.

Oil Company at its Robinson refinery in Crawford County; Natural Gas Pipeline Company of America at its St. Elmo plant in Fayette County and at its Herscher plant in Kankakee County; Texaco, Inc., at its Lawrenceville plant in Lawrence County and at its Lockport plant in Will County; Shell Oil Company at its Hartford plant in Madison County; and Mobil Oil Corporation at its Joliet refinery in Will County.

The amount of sulfur recovered in 1977 was 18.5 percent higher than that recovered in 1976 and was valued 19.2 percent higher. Illinois ranked sixth in the nation in quantity of elemental sulfur recovered and seventh in value of shipments. The value of sulfur is included in the total value of mineral products manufactured (to avoid disclosing individual company data on lime).

Exfoliated vermiculite

Crude vermiculite mined outside the state was processed by the Construction Products Division of W. R. Grace and Company in West Chicago, Du Page County; by Mica Pellets, Inc. in De Kalb, De Kalb County; and by the International Vermiculite Company in Girard, Macoupin County. About 29.9 percent of the total amount of exfoliated vermiculite processed was used for loose-fill insulation, 18.8 percent for block insulation, 7.1 percent for concrete aggregate, and 11.0 percent for horticultural purposes. Fertilizer carrier, plaster aggregates, soil conditioning, and other unspecified uses accounted for the remaining 33.2 percent of the total. The quantity of exfoliated vermiculite processed in 1977 was 30.2 percent higher than in 1976, and the value increased by 64.6 percent.

Primary slab zinc

AMAX, Inc. completed an extensive rehabilitation program at its Sauget, St. Clair County, electrolytic zinc plant during the year. AMAX processed special high-grade zinc from domestic and foreign ores and concentrates again in 1977. Production data are not available.

Secondary slab zinc

During 1977, secondary slab zinc was produced by Apex Smelting Company in Chicago, Cook County, and by Sandoval Zinc Company in Sandoval, Marion County. Production data are not available.

MINERAL PRODUCTS MANUFACTURED

Mineral products manufactured in Illinois in 1977 from crude mineral materials mined in Illinois and elsewhere included cement, clay products, coke, glass, and lime. Available data are given in the next sections.

Cement

Production. In Illinois 1,915,206 tons of finished portland cement were manufactured in 1977, a 3.6 percent increase over 1976 production. Production of prepared masonry cement increased in 1977; however, since there were only two producers in 1977, production data is withheld. Four Illinois companies produced cement: Centex Corporation at La Salle, La Salle County; Marquette Cement Manufacturing Company at Oglesby, La Salle County; Medusa Corporation at Dixon, Lee County; and Missouri Portland Cement Company at Joppa, Massac County.

Finished portland cement shipments totaling 1,823,474 tons were valued at $61.8 million, an 11.7 percent increase in quantity and a 15.6 percent increase in value from the 1976 level (table 27). Both quantity and value of prepared masonry cement shipments increased more than 20 percent.

Raw materials used in the manufacture of cement include cement rock (an argillaceous limestone containing lime, silica, alumina, and magnesia), limestone, clay, shale, sand, fly ash, slag, and gypsum. In 1977 Illinois produced 3,065,404 tons of crushed limestone for use in cement manufacture (table 25) and consumed 2,910,911 tons (including cement rock), which means that Illinois was a net exporter of limestone for use in cement.

Bulk shipments of cement from Illinois plants to customers were made by truck (99.4 percent), rail, and barge. Container shipments of cement were made by truck and rail only, with 90.2 percent of the shipments moved by truck.

Consumption. A total of 3,622,000 tons of portland cement was consumed in Illinois in 1977—138,000 tons less than in 1976 (fig. 13). Only 52.9 percent of the portland cement consumed in Illinois was produced in the state; the rest was imported from other states.

Illinois consumed 133,000 tons of masonry cement in 1977—16,000 tons more than in 1976.

Clay products

To obtain accurate, current information about the amount and value of clay products manufactured in Illinois, the Illinois State Geological Survey sends questionnaires each year to all producers in the state. Eleven of the 23 companies responding to the 1977 questionnaire reported clay mining operations.

Clay products produced in Illinois in 1977 were valued at $58.4 million: whiteware and pottery ($16.6 million); structural clay products such as common and face brick, drain tile, and sewer pipes ($14.9 million); and refractories and other products ($26.9 million). In 1977 Illinois produced 136.6 million bricks (building-common and face); 128.4 million bricks were shipped at a value of $11.0 million.

Coke

Production. Four Illinois oven coke operations—three in Cook County and one in Madison County—produced 1,591,000 tons of coke and recovered 762,000 tons of coke breeze in 1977. Coke production was down 6.7 percent, and breeze production up 182.2 percent from 1976 (table 28). On the basis of an average value of $103.27 per ton (up $8.92 per ton from 1976) received by producers for all grades of coke, Illinois coke production in 1977 was valued at $164.3 million, 2.1 percent higher than the 1976 value (table 29). Most of the coke produced in 1977 was used in blast furnaces by the producing companies, and some coke was sold from stocks. By-products in addition to coke breeze recovered at Illinois oven-coke plants included coke oven gas, tar, crude light oil, and ammonia.

The coal used for the manufacture of coke in Illinois in 1977 came from Illinois (32.2 percent) and five other states—Kentucky, 34.4 percent; West Virginia, 21.8 percent; Virginia, 8.1 percent; Pennsylvania, 3.3 percent; and Oklahoma, 0.2 percent (table 29).

Illinois coal used for coking purposes was shipped from mines in Jefferson, Franklin, and Saline Counties only, according to the U.S. Bureau of Mines.

Consumption and uses. Illinois consumed 3,703,000 tons of coke and 216,000 tons of coke breeze in 1977 (table 28), a 4.7 percent increase in coke consumption and a 32.3 percent decrease in breeze consumption from 1976 levels. Coke is used for the production of pig iron, for foundry and other industrial purposes, and for residential heating. Coke breeze was used for fuel in steam plants, in agglomerating plants, and elsewhere.

Glass

Glass and/or fiberglass was manufactured by companies in Du Page, Lake, La Salle, Logan, McLean, Macon, Madison, Marion, Montgomery, St. Clair, and Will Counties. Production data are not available.

Lime

Production. Illinois ranked eight in the nation in lime production in 1977. Hydrated lime and quicklime were produced by two companies, both in Cook County: Marblehead Lime Company, a division of General Dynamics, operates two plants (at South Chicago and Thornton) and Vulcan Materials Company operates one plant (at McCook). The total amount of lime produced in 1977 was 1.3 percent below the 1976 level, but the value was up 10.6 percent.

Consumption and uses. A total of 1,031,000 tons of lime was consumed in Illinois in 1977, 2.3 percent more than in 1976 (fig. 14). Illinois was one of the leading hydrate-consuming states. The lime was used for steel furnaces, refractories, water purification, sewage treatment, and other purposes.

■ PRELIMINARY PRODUCTION DATA: 1978

According to the U.S. Bureau of Mines, preliminary figures for 1978 show that Illinois remained the leading producer of fluorspar and tripoli and ranked among the leading five states in the production of stone and peat. Coal continued to be the leading mineral commodity in value in 1978, being valued at $984.6 million, or 61.8 percent of the total $1,593.1 million total value of mineral materials mined.

Mineral materials mined

Preliminary production data for Ilinois indicate that the total value of mineral materials mined reached a record high of $1,593.1 million—a 5.6 percent increase over the value reported for 1977 (table 30). The increase in value resulted from greater production of several minerals and from a general rise in mineral-commodity prices.

Fuels

During 1978 mineral fuels produced—coal, crude oil, and natural gas—were valued at $1,311.1 million. Of this amount, 75.1 percent came from coal, 24.7 percent from crude oil, and the remaining 0.2 percent from natural gas. In 1977, the value of mineral fuels produced totaled $1,246.6 million—5.2 percent lower than the 1978 level.

Coal. Illinois production dropped again in 1978 to 48.7 million tons from 53.9 million tons in 1977. Coal production declined in nearly all the states in 1978; only a few states showed slight increases in production. The decrease in production is attributed mainly to the longest nationwide coal miners' strike in history, which began on December 6, 1977 and lasted for 110 days. United States coal production was cut almost in half during the first three months of 1978 and Illinois production was cut even more drastically.

The increased value of Illinois coal production in 1978 (5.8 percent over the 1977 level) resulted from an increase in average f.o.b. mine price of Illinois coal from $17.28 in 1977 to $20.20 in 1978. Of the total 48.7 million tons of coal produced in Illinois, 24.9 million tons (51.1 percent) came from underground mines and 23.9 million tons (48.9 percent) came from surface mines. These figures represent a 15.9 percent decline in underground mining

TABLE 30—PRELIMINARY MINERAL PRODUCTION OATA FOR 1978

Commodity	Unit	1978 Quantity	1978 Value (thousand $)	1977 Quantity	1977 Value (thousand $)	Percentage of change from 1977 to 1978 Quantity	Percentage of change from 1977 to 1978 Value
MINERAL MATERIALS MINED							
Fuels							
Coal	thousand tons	48,744	984,632	53,880	931,054	- 9.5	+ 5.8
Crude oil	thousand bbl	23,362	325,000	25,608	314,293	- 8.8	+ 3.4
Natural gas	thousand Mcf	1,159	1,507	1,003	1,204	+15.6	+25.2
Industrial and construction materials							
Stone[a]	thousand tons	59,303	160,522	57,074	136,073	+ 3.9	+18.0
Sand and gravel	thousand tons	38,000	103,000	37,613	101,230	+ 1.0	+ 1.7
Clay [b]	thousand tons	620	2,788	951	5,117	-34.8	-45.5
Fluorspar	thousand tons	112,540	11,671	131,218	13,941	-14.2	-16.3
Tripoli	thousand tons	W	W	W	W	-25.0	-22.8
Metals							
Lead	tons	W	W	W	W	+59.3	+74.8
Zinc	tons	W	W	W	W	-31.8	-39.5
Silver	thousand troy ounces	W	W	W	W	0	+22.2
Others							
Peat	thousand tons	84	1,594	82	1,478	+ 2.4	+ 7.8
Gemstones	—	NA	2	NA	2	—	0
Barite	tons	W	W	W	W	-50.0	-84.8
Values that connot be disclosed (W)			2,348		3,892		-39.7
Total value of mineral materials mined			1,593,064		1,508,284		+ 5.6

[a]Includes dimension stone; [b]Excludes fuller's earth; included with value of items indicated by symbol W.
[c]W = withheld to avoid disclosing individual company confidential data.
[d]NA = not available.
Sources: U.S. Bureau of Mines, Illinois Oepartment of Mines and Minerals, and Oil and Gas Section of the Illinois State Geological Survey.

and a 1.8 percent decline in surface mining from 1977. This is the sixth consecutive year in which underground mine production exceeded that of surface mines.

In 1978, as in 1977, 21 counties reported coal production. According to the Illinois Department of Mines and Minerals, 71 coal mines (28 underground mines and 43 surface mines) operated in Illinois during 1978. Total employment in Illinois mines increased for the ninth consecutive year in 1977: from 16,114 employees in 1977 to 17,861 in 1978 (5,241 at surface mines and 12,620 at underground mines.)

TABLE 31—COAL SHIPMENTS FROM ILLINOIS TO CONSUMING SECTORS, 1977 AND 1978 (1000 unit tons)

Consuming sector	1977	1978	Percentage of change
Electric utilities	45,105	41,142	- 8.8
Coke and gas plants	2,974	2,141	- 28.0
Retail dealers	256	171	- 33.2
All others	6,037	4,989	- 17.4
Railroads	—	—	—
Used at mine	41	46	+ 12.2
Mine stock (adjusted)	-87	1	+101.1
Total	54,326	48,490	- 10.7

Source: U.S. Bureau of Mines Bituminous Coal and Lignite Distribution, Calendar Year, 1977, 1978.

The various consuming sectors and the states to which Illinois coal was shipped in the first nine months of 1978 are shown in tables 31 and 32, respectively.

Several new mines are being constructed or planned in Illinois to meet the projected increase in demand for coal. New mines and expansions to existing mines officially announced as of August 1979 are listed in tables 33 and 34.

TABLE 32—COAL SHIPMENTS FROM ILLINOIS TO CONSUMING STATES, 1977 AND 1978 (1000 unit tons)

Consuming state	1977	1978	Percentage of change
Illinois	21,767	20,509	- 5.8
Missouri	13,405	11,000	- 17.9
Indiana	6,408	5,440	- 15.1
Wisconsin	4,440	3,994	- 10.1
Iowa	2,627	2,213	- 15.8
Kentucky	997	335	- 66.4
Minnesota	1,223	753	- 38.4
Mississippi	587	399	- 32.0
Michigan	914	901	- 1.4
Georgia-Florida	1,440	1,874	+ 30.1
Tennessee	252	43	- 82.9
Alabama	217	846	+ 289.9
Other states[a]	37	+ 159	+ 329.7
Exports (Mexico & Canada)	12	24	+ 100.0
Total	54,326	48,490	- 10.7

[a] Includes coal used at mines and net change in mine inventory.

Source: U.S. Bureau of Mines Bituminous Coal and Lignite Distribution, Calendar Year, 1977 and 1978.

TABLE 33—NEW COAL MINES ANNOUNCED OR UNDER CONSTRUCTION IN ILLINOIS
(as of August 1979)

Company and mine name	Location	County	Type of mine[a]	Coal seam	Principal market	Scheduled initial production	Capacity at full operation (million tons)	Status
AMAX Coal Co.								
Crab Orchard	Near Crab Orchard	Williamson	S	Herrin (No. 6)	Steam	1981	1.00	Announced
Unnamed	NA	NA	U	NA	Steam	1982	2.10	Announced
Unnamed	NA	NA	S	NA	Steam	1984	1.10	Announced
Arch Mineral Corp.	NA	NA	S	NA	Steam	NA	2.00	Announced
Atlantic Richfield Co.								
Black Hawk	NA	Edwards	U	Harrisburg (No. 5)	Steam	1985	1.60	Announced
Consolidation Coal Co.								
Unidentified	NA	NA	S	NA	Steam	1984	1.00	Announced
Unidentified	NA	NA	S	NA	Steam	1985	1.00	Announced
Freeman United Coal Mng. Co.								
Crown 3	Girard	Macoupin	U	Herrin (No. 6)	Steam	1982	2.00	Under construction
Industry	Industry	McDonough	S	Colchester (No. 2)	Steam	1982	0.50	Announced
Kerr-McGee Coal Corp.	NA	NA	U	(No. 6)	Steam	1984	2.50	Announced
Mapco								
Whitetiki	SE of Carmi	White	U	Herrin (No. 6)	Steam	1984	NA	Announced
Morris Coal, Inc.								
Morris 6	NA	Williamson	U	NA	Steam	1930	1.00	Announced
NICOR Inc. & West. Assoc. Coal Corp.	Central IL	Sangamon	U	Springfield (No. 5)	Steam	1981	2.00	Announced
Peabody Coal Co.								
Baldwin 3	St. Libory	St. Clair	U	Herrin (No. 6)	Steam	1980	1.30	Under construction
Baldwin 4	NA	St. Clair	U	Herrin (No. 6)	Steam	1981	1.30	Announced
Sahara Coal Co.								
No. 22	Carrier Mills	Saline	U	Herrin (No. 6)	Steam	1979	0.20	Under construction
Shell Oil Co.								
Niantic Annex 1	NA	Logan	U	Springfield (No. 5)	Steam	1986	2.50	Announced
Western Fuels Assoc.								
Brushy Creek Mine	Near Harco	Saline	U	Herrin (No. 6)	Steam	1930	1.20	Announced
Zeigler Coal Co.								
No. 6	NA	Williamson	U	Herrin (No. 6)	Steam	1982	2.00	Announced

[a] S = surface; U = underground.
NA = not available.

Crude oil and **natural gas.** Production decreased in 1978. The production of crude oil in Illinois decreased in 1978 to 23.4 million barrels, 8.8 percent less production than in 1977. At an average value of $13.91 per barrel, the 1978 production was valued at $325.0 million. Both the marketed production of natural gas and its value increased slightly in 1978. Total natural gas marketed was 1,159 million cubic feet—a 15.6 percent increase over the 1977 level, and the production was valued at $1.5 million—a 25.2 percent increase over the 1977 value (table 30).

According to data from the Oil and Gas Section of the Illinois State Geological Survey, total footage drilled by the oil and gas industry in Illinois in 1978, including service wells and structure tests, was 3,214,099 (down 3.4 percent from 1977). The oil and gas producing industry drilled 3,084,466 feet of this total (down 1.0 percent from

TABLE 34—ILLINOIS COAL MINE EXPANSIONS AND NEW MINES NOT AT FULL CAPACITY (as of August 1979)

Company and mine name	Location	County	Type of mine[a]	Coal seam	Principal market	Scheduled year of full capacity	Capacity at full operation (million tons)	1978 production (million tons)
AMAX Coal Co.								
Oelta	Crab Orchard	Saline	S	Herrin (No. 6)	Steam	Expansion	2.40	—
Sunspot	Near Vermont	Fulton	S	Colchester (No. 2)	Steam	Expansion	1.20	0.74
Wabash	Near Keensburg	Wabash	U	Harrisburg (No. 5)	Steam	1979	3.60	1.37
Consolidation Coal Co.								
Burning Star 5	Oe Soto	Jackson	S	Herrin (No. 6) Harrisburg (No. 5)	Steam	1979	2.80	1.49
Freeman United Coal Mng. Co.								
Crown 2	Virden	Macoupin	U	Herrin (No.6)	Steam	—	2.40	1.22
Inland Steel Co.								
Inland 2	Near McLeansboro	Hamilton	U	Harrisburg (No. 5)	Metal-lurgical	1984	2.50	*
Midland Coal Co.								
Rapatee	Near Middlegrove	Fulton	S	Springfield (No. 5)	Steam	—	0.70	0.44
Monterey Coal Co.								
Monterey 2	Near Albers	Clinton	U	Herrin (No. 6)	Steam	1981	3.60	0.36
Morris Coal, Inc.								
Morris 5	Crab Orchard	Williamson	U	Harrisburg (No.5)	Steam	—	1.00	0.20
Morris 7	Crab Orchard	Williamson	U	Harrisburg (No.5)	Steam	1979	0.60	0.05
Old Ben Coal Co.								
No. 25	Near Thompsonville	Franklin	U	Herrin (No. 6)	Steam	1981	4.00	0.75
No. 27								0.12
Peabody Coal Co.								
Marissa**	Marissa	St. Clair	U	Herrin (No. 6)	Steam	1979	1.30	—
Zeigler Coal Co.								
No. 5	Murdock	Douglas	U	Herrin (No. 6)	Steam	—	2.20	0.97
No. 11	Near Sparta	Randolph	U	Herrin (No. 6)	Steam	1979	1.50	0.59

[a] S = surface; U = underground.
* Began operating 4/79.
** Name changed from Baldwin 2.

1977) and the natural gas storage industry drilled 129,633 feet (down 38.9 percent). There were 1,036 new holes drilled for oil and gas in 44 of the 102 Illinois counties, the same number of counties as in 1977. The new holes resulted in 513 oil wells, 14 gas wells, and 509 dry holes—a success ratio of 50.9 percent as compared with a success ratio of 58.4 percent in 1977.

One of the significant features of drilling activity during the past several years has been the testing of the Salem Limestone and Ullin Limestone. This testing continued in 1978 and largely accounted for the fairly high level of drilling activity reported. These two formations accounted for 40 percent of the 1978 discoveries.

Drilling for oil in the Fort Payne Formation in New Harmony Consolidated Field in White County highlighted activity in 1978. Production from the Fort Payne was reported in the field early in 1978, and by the end of January 1979, 12 producers had been reported. Initial production figures ranged up to 600 barrels of oil per day and averaged 210 barrels per well.

Industrial and construction materials

Although stone and sand and gravel production in Illinois increased slightly in 1978, clay, fluorspar, and tripoli production decreased significantly. Total stone production increased by 3.9 percent, while that of sand and gravel increased slightly by 1.0 percent. Two new limestone quarries were opened in Illinois during the period, one by Kincaid Stone Company in Jackson County, the other by Avery Gravel Company in Kendall County. The production of fluorspar in Illinois in 1978 decreased by 14.2 percent; however, production from the Illinois-Kentucky district accounted for about 90 percent of the domestic total in the United States. The decrease in Illinois fluorspar production was due to market conditions. Late in 1978

the Ozark-Mahoning Company, a subsidiary of Pennwalt Corp., started sinking a production shaft at its newly-discovered Denton orebody in northeastern Hardin County. Tripoli production fell by 25 percent and clay production declined by 34.8 percent from the 1977 levels.

Metals and other minerals

Lead, zinc, barite, and small amounts of silver were recovered as by-products of Illinois fluorspar production in 1978. The total value of metals mined was 32.4 percent lower than the 1977 value; the value of barite decreased 50 percent from the 1977 level.

Illinois peat production in 1978 rose to 84,000 tons, with a value of $1,594,000. In 1978, as in the past several years, fluorspar—the gemstone mined in Illinois—contributed approximately $2,000 to the total value of mineral materials mined.

Mineral materials processed

Preliminary data for most mineral materials processed in Illinois in 1978 are not yet available. According to the American Iron and Steel Institute, Illinois raw steel production rose to 12,424,853 tons in 1978, an increase of 14.3 percent from the 1977 level of 10,871,476 tons.

Illinois producers sold 32,884 tons of iron oxide pigments valued at $19.1 million—a 16.2 percent decline in quantity but a 5.6 percent increase in value from the 1977 level.

Mineral products manufactured

Mineral products manufactured in Illinois in 1978 for which preliminary data are available include cement, lime, and coke. The State's cement industry operated at or near capacity throughout most of 1978. The cement shortage that had become severe on the west coast during 1977 reached Illinois in 1978, causing disruptions in construction during the summer and fall months. Both portland and masonry cement were produced in 1978. Portland cement production was estimated to be 1,963,000 tons (a 7.7 percent increase) valued at $75.2 million (21.7 percent increase). Although masonry cement production data must be concealed to avoid disclosing individual company data, preliminary figures showed an increase of 30.8 percent in quantity and 47.8 percent in value over 1977. Lime production increased 3 percent in quantity and 6.6 percent in value over 1977 levels. Most of the increase was due to renewed activity in the steel industry, which had experienced a relatively low level of production in 1977. The quantity of coke manufactured is estimated at 1,430,000 tons—a decline of 10.1 percent from the 1977 level.

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