Geol Survey

455

S 14.GS: CIR 455 C. 2

STATE OF ILLINOIS

DEPARTMENT OF REGISTRATION AND EDUCATION



MINERAL PRODUCTION IN ILLINOIS IN 1969

W. L. Busch

CIRCULAR 455

ILLINOIS STATE GEOLOGICAL SURVEY
URBANA, ILLINOIS 61801
John C. Frye, Chief





MINERAL PRODUCTION IN ILLINOIS IN 1969

W. L. Busch

ABSTRACT

Mineral production in Illinois in 1969 established a new all-time high value of 692.9 million dollars. This was the fourth successive year that a new high in value was attained and the fourteenth year that mineral production in Illinois exceeded 600 million dollars. In contrast with other years, some unusual increases and declines occurred in Illinois mineral production during 1969. The quantity and value of minerals produced in 1969 and in other years are summarized in the tables and maps of this report.

PRODUCTION OF MINERAL PRODUCTS SUMMARIZED IN LISTED TABLES

Material	Table Number
Coal	1, 2, 4, 5, 6, 7, 8, 17
Crude oil	1, 2, 4, 5, 9, 17
Stone	1, 2, 5, 10, 17
Cement	1, 2, 5, 17
Clay products	1, 2, 4, 14, 17
Sand	1, 2, 5, 11, 17
Gravel	1, 2, 5, 12, 17

Material	Table Number
Silica sand	1, 2, 5, 13, 17
Fluorspar	1, 2, 5, 15, 17
Zinc	1, 2, 5, 16, 17
Lead	1, 2, 5, 16, 17
Lime ^a	5, 17
Tripoli ^a	5, 17
Natural bonded molding sand ^a	17

^aProduction figures not available for publication.

ILLINOIS MINERAL INDUSTRY

The value of minerals produced in Illinois in 1969 set a record annual high of 692.9 million dollars. This amount was 22.3 million dollars, or 3.3 percent, more than the previous all-time high of 670.6 million dollars achieved in 1968. The total value of minerals produced in 1967 was 650 million dollars, and in 1966 the value was 644 million dollars. Each of these figures represented a record annual output.

In 1969 the value of coal accounted for 40.4 percent of the value of all minerals produced in the state, and crude oil supplied 23.3 percent. The combined value of these fuels amounted to 63.7 percent of the value of all minerals for the year. The quantity and total value of coal produced in 1969 was greater than those of the 1968 production; however, the amount and total value of crude oil produced in 1969 was less than those of the 1968 production.

The second most valuable group of minerals produced in Illinois is the stone products, which include crushed stone, cement, and lime. In 1969 the quantity of crushed stone produced declined, but the total value increased, as compared with the 1968 production. The production of portland cement declined in both quantity and value in 1969; however, the amount and total value of masonry cement increased slightly over the 1968 production of this commodity. Lime tonnage and total value had small increases in 1969. As a group these stone products contributed 18.3 percent of the state's total mineral value in 1969.

Clay products produced in Illinois, amounting to 58.4 million dollars, represented 8.4 percent of the 1969 state total mineral products value. Illinois clay products include face brick and common brick, drain and sewer tile, refractories, lightweight aggregate, pottery and whiteware. The value of clay products reported for 1969 showed an increase over the value reported for 1968.

Illinois sand and gravel recorded a mixed pattern of production in 1969 as compared with 1968. The tonnage of common sand and gravel produced in 1969 was less than the 1968 tonnage, but the total value was more than the 1968 total value. Silica sand production in 1969 scored gains in amount and value over the respective figures for 1968. The combined values for special sands produced in 1969 were slightly more than the total value reported for special sands for 1968. All sands and gravel produced in Illinois furnished 8.3 percent of the state's entire mineral products value in 1969.

Fluorspar, lead, and zinc, as a group, showed a sharp decline in total combined value for 1969 as compared with 1968. In 1969, these three minerals accounted for 1.3 percent of the state's total mineral value.

Record of the Illinois Mineral Industry, 1969

Each of the 17 tables and 3 maps published in this report is summarized here under its table number and title.

Table 1 - Summary of Illinois Mineral Production, 1968-1969

Items listed in table 1 for the years 1968 and 1969 are the minerals produced in Illinois, the amounts reported produced by commercial operators, the total annual value for each product, and the state-wide average value per ton or barrel for each product. The values of the mineral products listed under footnote "c" were combined to avoid revealing the output of any individual producer of these commodities.

Table 2 - Comparison of Illinois Mineral Production in 1968 and 1969

All of the mineral products listed in table 1 are also listed in table 2. The figures entered in table 2 indicate by the amounts and values whether the 1969 production and value of each product were greater or less than the 1968 production and value. The balance of increases and declines in value for the mineral products shows a total net gain of 22.3 million dollars, or an increase of 3.3 percent for 1969 over 1968.

Table 3 - Value of Illinois Mineral Production, 1940-1969

General increases in mineral production throughout the state during the 30 years indicated in table 3, plus gradual price increases for various mineral products of Illinois, have brought about greater total annual values for the state. Each of the four most recent years, 1966-1969, established a new all-time high in value for mineral production in this state.

Table 4 - Value of Illinois Mineral Products as Percentage of State Total Mineral Products Value, 1959-1969

The percentage figures given in table 4 show that the value of fuels - coal and crude oil - accounted for almost two-thirds of the state's entire mineral products value in 1969. However, the value of coal accounted for almost two-thirds of the total value of the fuels in 1969. During the years 1956-1969 the percentage value of crude oil has declined steeply as compared to the total value of all minerals produced in the state.

During recent years the value of building and construction materials (stone, cement, sand and gravel) has increased its percentage share of the state's total annual value of mineral products. The annual value of clay products shows a gradual percentage decline, and the combined annual values of fluorspar, zinc, and lead, as a percentage of the state total value, usually shows only slight change from year to year.

Table 5 - Average Value of Illinois Mineral Products at Plant Site, 1962-1969

The plant site values for Illinois mineral products recorded in table 5 give some indication of recent prices per ton, or per barrel, for the various products listed.

Table 6 - Illinois Coal Production by Counties, 1969

In 1969 twenty-four Illinois counties reported a total production of 64.8 million tons of bituminous coal, valued at 280.1 million dollars, for an average value of \$4.32 per ton. The state of Illinois ranked fourth in 1969 among coal-producing states of the nation and was exceeded in production only by the states of West Virginia, Kentucky and Pennsylvania. Illinois mines supplied about 11.5 percent of all bituminous coal produced in the United States in 1969. Of the 64.8 million tons of coal mined in Illinois during 1969, approximately 46.5 percent came from underground mines and about 53.5 percent was produced by strip mines.

The value of coal produced in 1969 amounted to 40.4 percent of the value of all mineral products produced in Illinois for the year. Table 4 indicates the annual percentage that the value of coal contributed to the state total value of all minerals produced each year from 1956 through 1969. Table 5 lists the Illinois

4

average value per ton of coal at the mine for the years 1962-1969, and table 17 shows the position held by each county among all Illinois counties producing coal in 1969. The 24 counties of Illinois that produced coal in 1969 are shown by the county map in figure 1, with the intensity of mining activity indicated by the degree of shading.

Table 7 - Number of Illinois Coal Mines, Producing Counties, and Employees, 1952-1969

Although the figures in this table cover only a limited span of time, the brief history of Illinois coal mining that the table does show is of special interest. Table 7 records the steady dropoff in the total number of mines operating throughout the state, and it also shows the diminishing number of strip mines and underground mines that were active, 1952-1969. The number of counties in which coal has been mined during the 18-year period was less in 1969 than the number of counties producing in 1952.

This table also indicates that the total number of employees engaged in the mining of coal over the years has dropped from almost 24,000 in 1952 to less than 10,000 in 1969. The number of employees engaged in strip mining in Illinois has remained very constant, but the number of employees engaged in underground mining has dropped from more than 20,000 in 1952 to about 6,000 in 1969.

Table 8 - Coal Production by Illinois Counties, 1882-1969

The cumulative coal production by Illinois counties since 1882 is shown in table 8. More than 4.1 billion tons of coal have been produced from Illinois mines during this period of 88 years. Of the 71 counties that have produced some coal since 1882, 13 counties have produced more than 100 million tons of coal each. As a group, these counties have supplied about 3.3 billion tons, or 80.6 percent of the state's total coal output since 1882. Table 8 also records the total number of years that each county has produced coal since 1882 and the most recent year that it was productive.

Table 9 - Estimated Oil Production by Illinois Counties, 1888-1969

Crude oil produced in Illinois during 1969 was estimated at about 50.7 million barrels, which was valued at 161.3 million dollars for an average price of \$3.18 per barrel.

The estimated amount and value of oil produced by Illinois counties in 1969 are shown in table 9 with the percentage of oil that each producing county contributed to the 1969 total production. The indicated total oil production for each county from 1888 through 1969 is also included in table 9. Of the 43 counties producing oil in 1969 (fig. 2), 14 counties produced more than 1 million barrels each for a total of 44.3 million barrels, or about 87.3 percent of the state's entire oil production for 1969.

The annual percentage that the value of oil contributed to the state total value of all minerals produced each year from 1956 through 1969 is shown in table 4. Table 5 lists the average price per barrel for Illinois oil from 1962 through 1969. The relative position held by each county producing oil in 1969 is tabulated in table 17.

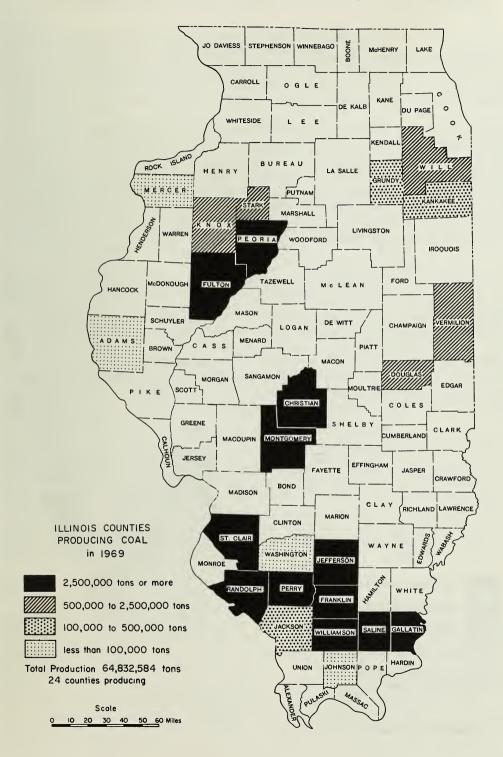


Fig. 1 - Illinois coal production by counties in 1969.

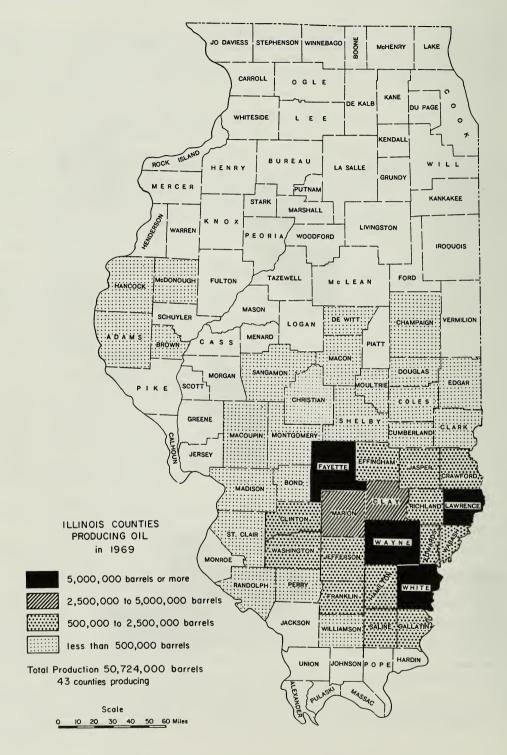


Fig. 2 - Illinois oil production by counties in 1969.

Table 10 - Illinois Stone Production by Regions, 1969

A total of 51.7 million tons of crushed and broken stone was reported produced by commercial quarry operators in 1969. The value of this processed stone amounted to 78.4 million dollars for an average of \$1.52 per ton. The tonnage produced in 1969 was supplied by 231 operations located in 60 counties throughout the state.

The record of stone production in Illinois by regions (fig. 3) and according to three categories of use-road and building, agriculture, and all other uses-is given in table 10. This table also lists all counties reporting stone production and the average value at the quarry for all stone uses in all regions for 1969. The value of crushed stone, plus the values of the stone products, cement and lime, furnished about 18.3 percent (table 4) of the total Illinois mineral products value for 1969. The yearly average value per ton of stone at the quarry from 1962 through 1969 is given in table 5. The position held by each county producing stone in 1969 is reported in table 17.

Table 11 - Illinois Common Sand Production by Regions, 1969

Table 12 - Illinois Gravel Production by Regions, 1969

In 1969 commercial producers in Illinois reported the production of 38.9 million tons of common sand and gravel. The combined value of these materials amounted to about 40.3 million dollars.

The northeast region of the state (fig. 3) produced the largest amounts of sand and gravel in 1969. (Figure 3 is a county outline map of Illinois showing the regional divisions of the state.) The second most important sand and gravel producing area in the state in 1969 was the central region, and the northwest region was in third place.

With the exception of some counties that border on the Mississippi, Ohio, or Wabash Rivers, the southern part of Illinois has comparatively few sand and gravel operations. Table 11 (common sand) and table 12 (gravel) indicate the amount and value of sand and gravel produced in each region of the state. These tables also list all counties producing sand and gravel and the average value at the pit for all uses of sand or gravel in all regions in 1969. The annual average value of sand and gravel for the years 1962 through 1969 is given in table 5. Table 17 lists in numerical order the relative position held by each county producing sand and gravel in 1969.

Table 13 - Illinois Silica Sand Production, 1968-1969

Silica sand is produced in Illinois primarily in La Salle County and in smaller amounts in Ogle County. The most important use for Illinois silica sand in 1968 and 1969 was for the manufacture of glass, according to table 13. The second most important use for this material was for molding sand purposes. Unground silica sand is also used for grinding, blast, engine, filtration, and oil sand. Ground silica sand is used as an abrasive, as a filler, and as an ingredient in enamel, glass and pottery; it also has chemical, foundry and other uses.

A total of 4.4 million tons of silica sand, which was valued at 15.8 million dollars, was produced in Illinois during 1969. Silica sand production in 1968 totaled 3.9 million tons with a value of 13.4 million dollars. The combined value of all sands and gravel produced in Illinois during 1969 amounted to 8.3 percent of the value of all minerals produced in the state (table 4). Table 5 shows the average

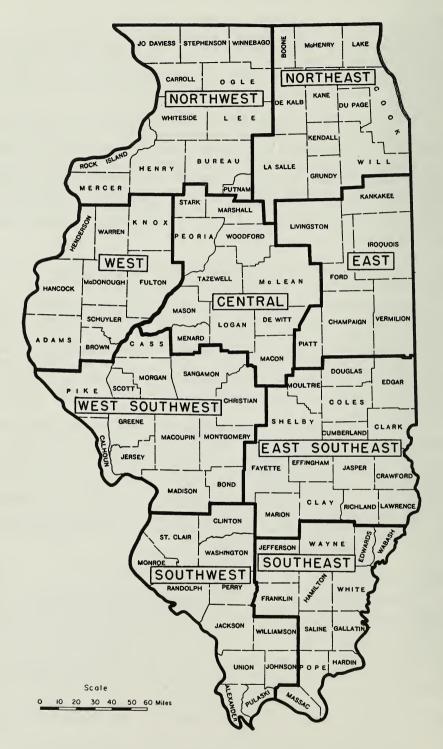


Fig. 3 - County outline map of Illinois showing area division.

annual value, per ton, of common sand and gravel and silica sand from 1962 through 1969. Table 17 indicates that La Salle and Ogle Counties are the only counties in Illinois producing silica sand.

Table 14 - Production of Illinois Clay Products, 1968-1969

The value of clay products reported produced in Illinois during 1969 amounted to 58.5 million dollars, as compared with a total value of 53.6 million dollars in 1968. In 1969, 38 clay products plants located in 23 counties throughout Illinois reported production; however, in 1968, 41 plants located in 24 counties reported production. The total value of clay products produced in 1969 was about 8.4 percent of the value of all minerals produced in the state (table 4). The rank of each county in the state reporting the production of clay products for 1969 is recorded in table 17 of this report.

Table 15 - Fluorspar Shipped and Consumed, 1960-1969

Due to work stoppage in fluorspar mining, Illinois producers shipped to consumers, during 1969, only about 88,480 tons of finished fluorspar. Shipments of fluorspar in 1968 amounted to 188,325 tons (table 1). The value of fluorspar shipments in 1969 was 4.7 million dollars, as compared with a total value of 9.1 million dollars for 1968 shipments (tables 1 and 2).

Traditionally, Illinois is the nation's leading fluorspar-producing state. This material is mined principally in Hardin County, with small amounts produced in Pope County. Both counties are located in the southern part of the state. Other information regarding Illinois fluorspar may be found in tables 5, 15, and 17.

Table 16 - Illinois Zinc and Lead Production, 1960-1969

Zinc and lead are recovered in Illinois from primary metal mines in Jo Daviess County, located in the northwestern part of the state, and as by-products of fluorspar mining in Hardin and Pope Counties in southern Illinois.

Because of a curtailment in the production of fluorspar during 1969, the amounts of zinc and lead recovered as by-products from fluorspar mining were reduced. However, the tonnage of zinc and lead produced in Jo Daviess County during 1969 offset, to some extent, the restricted production of these metals in Hardin and Pope Counties.

In 1969 Illinois mines produced 13,765 tons of zinc, valued at 4.0 million dollars, and 791 tons of lead, valued at \$235,700. The combined values of fluor-spar shipments and the values of zinc and lead produced in Illinois contributed about 1.3 percent (table 4) of the state's 1969 total mineral products value of 692.9 million dollars. Further information concerning the production of zinc and lead in Illinois may be found in tables 1, 2, 5, 16, and 17.

Table 17 - Summary of Minerals Produced by Illinois Counties, 1969

Table 17 is a convenient reference to the 102 counties of Illinois producing any of 14 mineral products. The table indicates the different mineral products produced in the state, and the numbers show the relative position held by each county among all counties producing a selected mineral product.

TABLE 1 - SUMMARY OF ILLINOIS MINERAL PRODUCTION, $1968-1969^{a}$

			1968 ^b			1969 ^b	
			Value at plants	. plants		Value at Plants	Plants
Material	Unit	Quantity	Total	Average	Quantity	Total	Average
Coal — bituminous	tons	62,143,076	\$249,193,735	\$ 4.01	64,832,584	\$280,076,763 \$	\$ 4.32
Crude oil	bbls	56,391,000	173,120,370	3.07	50,724,000	161,302,320	3.18
Limestone and dolomite	tons	52,665,155	77,194,915	1.47	51,681,297	78,428,150	1.52
Cement — portland 376 lb	bbls	9,371,801	32,475,145	3.47	8,720,263	29,996,460	3.44
Cement - masonry 280 lb	bbls	602,365	2,097,203	3.48	602,917	2,136,945	3.54
Clay products	1	1	53,613,873	i	ļ	58,466,631	1
Sand	tons	18,580,000	16,288,000	0.88	17,593,298	17,275,700	0.98
Gravel	tons	21,626,000	22,380,000	1.03	21,267,490	23,054,205	1.08
Silica sand	tons	3,912,000	13,405,000	3.43	4,394,950	15,770,919	3.59
Fluorspar	tons	188,325	9,134,132	48.50	88,480	4,676,065	52,85
Zinc	tons	18,182	4,909,140	270.00	13,765	4,019,400	292.00
Lead	tons	1,467	387,641	264.00	791	235,700	298.00
Other materials ^c	ı		16,400,846	I	ļ	17,460,742	1
Total value			\$670,600,000			\$692,900,000	

^aTable based on figures from the U.S. Bureau of Mines, the Illinois State Department of Mines and Minerals, and the b. Subject to revision. Clucludes lime, tripoli, natural gas, natural bonded molding sand, and sandstone. Illinois State Geological Survey.

TABLE 2 - COMPARISON OF ILLINOIS MINERAL PRODUCTION IN 1968 and 1969^a

		Product	Production change 1968—1969	8-1969	Valu	Value change 1968-1969	696
Material	Unit	Increase	Decrease	Percent	Increase	Decrease	Percent
Coal - bituminous	tons	2,689,508	l	+ 4.3	\$30,883,028	 - \$-	+ 12.4
Crude oil	bb1s	1	5,667,000	- 10.0	1	11,818,050	8.9 -
Limestone and dolomite	tons	1	983,858	- 1.9	1,233,235	1	+ 1.6
Cement - portland 376 1b	bb1s	1	651,538	- 7.0	ı	2,478,685	9.7 -
Cement - masonry 280 lb	bb1s	552	ı	+ 0.1	39,742	1	+ 1.9
Clay products	ł	1	i	1	4,852,758	1	+ 9.1
Sand	tons	1	986,702	- 5.3	987,700	1	+ 6.1
Gravel	tons	1	358,510	- 1.7	674,205	1	+ 3.0
Silica sand	tons	482,950	1	+ 12.3	2,365,919	1	+ 17.6
Fluorspar	tons	1	99,845	- 53.0	1	4,458,067	8.84 -
Zinc	tons	1	4,417	- 24.3	1	889,740	- 18.1
Lead	tons	1	929	- 46.1	1	151,941	- 39.2
Other materials	1	1	1	I	1,059,896	1	+ 6.5
Total values					\$42,096,483	\$19,796,483	ļ
1969 net increase over 1968	value				\$22,300,000		+ 3.3

^aTable 2 based on figures tabulated in table 1.

TABLE 3 — VALUE	OF	ILLINOIS MINERAL PRODUCTION,	1940-1969
		(thousands of dollars)	

Year	Mineral production	Year	Mineral production	Year	Mineral production
1940	\$287,327	1950	\$539,236	1960	\$615,800
1941	335,504	1951	542,031	1961	604,000
1942	341,998	1952	500,820	1962	631,000
1943	337,912	1953	501,926	1963	615,000
1944	342,832	1954	519,242	1964	618,000
1945	344,431	1955	570,653	1965	618,500
1946	379,673	1956	613,364	1966	644,000
1947	458,737	1957	612,755	1967	650,000
1948	567,624	1958	611,625	1968	670,600
1949	487,808	1959	606,300	1969	692,900

TABLE 4 — VALUE OF ILLINOIS MINERAL PRODUCTS AS PERCENTAGE OF STATE TOTAL MINERAL PRODUCTS VALUE, 1956-1969

Year	Coa1	Crude oil	Stone products	Clay products	Sand and gravel	Fluorspar and metals	Total percent
1956	30.0	40.6	12.2	9.6	5.0	2.6	100
1957	30.5	40.1	12.3	9.9	4.8	2.4	100
1958	28.7	40.5	13.7	9.0	5.8	2.3	100
1959	30.4	38.7	13.7	9.6	5.5	2.1	100
1960	29.8	38.0	15.0	9.2	5.5	2.5	100
1961	29.2	39.1	14.5	9.3	5.8	2.1	100
1962	29.6	38.0	15.2	8.9	6.2	2.1	100
1963	31.9	36.3	15.2	8.8	5.9	1.9	100
1964	33.6	33.5	16.4	8.3	6.5	1.7	100
1965	35.2	30.3	17.1	8.5	6.6	2.3	100
1966	37.8	29.0	16.0	8.5	6.7	2.0	100
1967	38.7	28.0	16.9	7.1	6.8	2.5	100
1968	37.2	25.9	18.9	8.0	7.9	2.1	100
1969	40.4	23.3	18.3	8.4	8.3	1.3	100

TABLE 5 — AVERAGE VALUE OF ILLINOIS MINERAL PRODUCTS AT PLANT SITE, 1962—1969

Year	Coal (ton)	Crude oil (bb1)	Crushed stone (ton)	Cement (bbl)	Lime (ton)	Silica sand (ton)
1962	\$3.86	\$3.00	\$1.36	\$3.29	\$16.29	\$3.96
1963	3.80	2.96	1.33	3.28	16.51	3.61
1964	3.79	2.93	1.35	3.30	16.61	3.27
1965	3.74	2.93	1.34	3.26	15.73	3.30
1966	3.85	3.00	1.35	3.11	15.53	3.41
1967	3.88	3.02	1.41	3.32	15.38	3.37
1968	4.01	3.07	1.47	3.47	15.05	3.43
1969	4.32	3.18	1.52	3.45	15.61	3.59
Year	Sand (ton)	Gravel (ton)	Fluorspar (ton)	Zinc (ton)	Lead (ton)	Tripoli (ton)
1962	\$0.86	\$0.93	\$48.12	\$230.00	\$184.00	\$26.13
1963	0.85	0.97	49.58	230.00	216.00	26.90
1964	0.87	1.01	50.62	272.00	262.00	26.88
1965	0.85	0.91	49.40	292.00	312.00	26.59
1966	0.84	0.91	45.42	290.00	302.00	26.56
1967	0.85	0.96	46.90	277.00	280.00	31.03
1968	0.88	1.03	48.50	270.00	264.00	26.37
1969	0.98	1.08	52.85	292.00	298.00	26.41

TABLE 6 - ILLINOIS COAL PRODUCTION BY COUNTIES, 1969

	Number	Tons	mined	Total	Total
County	of mines	Underground	Strip	tons	va lue ^D
Adams	1		3,393	3,393	\$ 14,658
Christian	1	5,415,880		5,415,880	23,396,602
Douglas	1	913,284		913,284	3,945,387
Franklin	4	8,558,322		8,558,322	36,971,951
Fulton	6		6,130,908	6,130,908	26,485,523
Gallatin	3	1,490,561	1,131,345	2,621,906	11,326,634
Grundy	c		256,429	256,429	1,107,773
Jackson	2		100,555	100,555	434,398
Jefferson	3	4,661,242		4,661,242	20,136,565
Johnson	2		29,303	29,303	126,589
Kankakee	1		105,048	105,048	453,807
Knox	1		1,776,971	1,776,971	7,676,515
Mercer	2	14,945	5,566	20,511	88,608
Montgomery	2	3,263,547		3,263,547	14,098,523
Peoria	4	<u> </u>	2,736,888	2,736,888	11,823,356
Perry	3		8,907,937	8,907,937	38,482,288
Randolph	3	973,638	2,871,393	3,845,031	16,610,534
St. Clair	4	516,495	5,275,331	5,791,826	25,020,688
Saline	4	1,842,097	965,972	2,808,069	12,130,858
Stark	1		876,517	876,517	3,786,553
Vermilion	3	57,373	630,097	687,470	2,969,870
Washington	1	14,057		14,057	60,726
Will	С		666,636	666,636	2,879,868
Williamson	10	2,451,186	2,189,668	4,640,854	20,048,489
Total	62	30,172,627	34,659,957	64,832,584	\$280,076,763

a Production figures, Illinois State Department of Mines and Minerals. b Average mine value for Illinois coal estimated at \$4.32 per ton, 1969.

TABLE 7 - NUMBER OF ILLINOIS COAL MINES, PRODUCING COUNTIES, AND EMPLOYEES, $1952-1969^{a}$

	1	Number of mines			Total num	ber	
	All mines	Strip mines	Underground	Producing	E	mployees	
Year	Total	Total	Total	counties	All mines	Strip	Underground
1969	62	34	28	24	9,591	3,647	5,944
1968	69	33	36	24	9,538	3,510	6,028
1967	77	44	33	25	8,805	3,413	5,392
1966	84	48	36	26	8,994	3,428	5,566
1965	97	54	43	29	8,790	3,320	5,470
1964	108	62	46	32	9,079	3,376	5,703
1963	116	71	45	35	8,891	3,394	5,497
1962	116	69	47	35	8,774	3,303	5,471
1961	128	73	55	37	8,945	3,408	5,537
1960	142	81	61	38	10,533	3,493	7,040
1959	159	90	69	37	10,897	3,525	7,372
1958	179	102	77	37	11,386	3,787	7,599
1957	195	108	87	35	12,781	3,547	9,234
1956	192	95	97	36	12,936	3,451	9,485
1955	198	82	116	36	13,623	3,187	10,436
1954	206	68	138	37	16,665	3,180	13,485
1953	232	73	159	35	18,945	3,390	15,555
1952	263	71	192	38	23,821	3,422	20,399

^aSource: Illinois State Department of Mines and Minerals.

Average mine value for Illinois coal estimated at \$4.32 per ton, 1969. Mine tipple located in Kankakee County for one mine operated in Grundy, Kankakee, and Will Counties.

TABLE 8 - COAL PRODUCTION BY ILLINOIS COUNTIES, 1882-1969

	Tota1	Total	Last		Tota1	Tota1	Last
	production	years	year		production	years	year
County	(tons)	active	active	County	(tons)	active	active
Adams	341,924	26	1969	Marshall	12,516,141	70	1951
Bond	7,355,569	57	1942	Menard	13,462,005	84	1965
Brown	65,347	40	1963	Mercer	15,369,716	82	1969
Bureau	53,823,055	80	1964	Monroe	8,284	13	1941
Ca 1houn	96,247	27	1912	Montgomery	116,825,663	88	1969
Cass	212,477	53	1941	Morgan	190,787	64	1951
Christian	287,314,796	85	1969	Moultrie	2,032,236	16	1924
Clark	4,482	2	1955	Peoria	80,995,699	88	1969
Clay	801	1	1963	Perry	236,008,691	88	1969
Clinton	38,656,325	79	1960	Pike	5,081	8	1942
Coles	198,932	6	1888	Pope	1,562	11	1938
Crawford	45,400	16	1961	Putnam	10,071,893	29	1938
Douglas	9,583,566	24	1969	Randolph	105,368,797	88	1969
Edgar	915,698	41	1952	Richland	154	1	1890
Effingham	796	1	1890	Rock Islan		67	1948
21111GIIGII	,,,,	-	1070	ROOK IDIG	5,040,105	0,	1740
Franklin	551,481,956	71	1969	St. Clair	301,938,289	88	1969
Fulton	268,276,185	88	1969	Saline	231,158,544	88	1969
Gallatin	10,247,800	85	1969	Sangamon	233,449,607	83	1964
Greene	693,191	84	1967	Schuyler	7,747,691	84	1966
Grundy	43,520,621	86	1969	Scott	612,476	61	1942
Hamilton	22,097	16	1905	She1by	4,119,763	67	1950
Hancock	771,281	72	1958	Stark	6,372,586	79	1969
Hardin	40	1	1890	Tazewell	17,633,802	75	1956
Henry	22,910,053	84	1965	Vermilion	164,652,635	88	1969
Jackson	97,147,642	88	1969	Wabash	198,226	36	1964
Jasper	23,739	11	1939	Warren	685,466	73	1954
Jefferson	55,142,995	66	1969	Washington	•	88	1969
Jersey	120,350	59	1951	White	1,676,741	36	1940
Johnson	275,245	54	1969	Will	42,484,694	88	1969
Kankakee	8,858,008	44	1969	Williamsor Woodford	7,810,160	88 70	1969 1951
Knox	53,393,177	88	1969		,,010,100	, 0	2752
La Salle	65,547,638	79	1960	Total (188	32-1969)	4,117.	493,630
Livingston	10,111,437	80	1961	•		,	
Logan	14,533,376	84	1968	Estimated	production		
Macon	11,000,468	65	1947	(1833–18	•	73,	386,123
Macounin	265 084 600	87	1968	Total prod	luction		
Macoupin	265,984,690 2,634,903	69	1950	Total prod (1833-19		4 100	970 752
McDonough			1928	(1033-19	(0)	4,190,	879,753
McLean	5,544,139	47 83	1926				
Madison	164,295,772	83 82	1964				
Marion	39,247,722	02	1903				

^aProduction figures, Illinois State Department of Mines and Minerals.

TABLE 9 - ESTIMATED OIL PRODUCTION BY ILLINOIS COUNTIES, 1888-1969

	Taka 1	1969 Pr	oduction	
County	Total b production 1888—1969	Thousands of barrels	Percent of state total	1969 value ^c
Adams	169	4	0.01	\$ 12,720
Bond	6,954	66	0.13	209,880
Brown	217	2	_	6,360
Champaign	6	d		
Christian	23,007	364	0.72	1,157,520
Clark-Cumberland	87,409	525	1.03	1,669,500
Clay	121,530	2,809	5.54	8,932,620
Clinton	79,776	908	1.79	2,887,440
Coles	21,414	455	0.90	1,446,900
Crawford	218,286	2,271	4.48	7,221,780
De Witt	1,763	214	0.42	680,520
Douglas	3,418	45	0.09	143,100
Edgar	2,956	99	0.19	314,820
Edwards	42,400	785	1.55	2,496,300
Effingham	13,912	645	1.27	2,051,100
Fayette	365,156	5,645	11.13	17,951,100
Franklin	66,447	1,244	2.45	3,955,920
Gallatin	45,814	1,036	2.04	3,294,480
Hamilton	124,759	2,172	4.28	6,906,960
Hancock-McDonough	5,225	37	0.07	117,660
Jasper	45,832	1,332	2.63	4,235,760
Jefferson	75,877	1,293	2.55	4,111,740
Lawrence	361,553	5,714	11.26	18,170,520
Macon	864	10	0.02	31,800
Macoupin	232	8	0.02	25,440
Madison	16,521	150	0.30	477,000
Marion	383,818	3,777	7.45	12,010,860
Monroe	2			
Montgomery	114	2		6,360
Moultrie	. 81	4	0.01	12,720
Perry	669	21	0.04	66,780
Randolph	3,814	133	0.26	422,940
Richland	92,550	2,154	4.25	6,849,720
St. Clair	2,993	110	0.22	349,800
Saline	18,799	694	1.37	2,206,920
Sangamon	1,827	220	0.43	699,600
Schuyler	1			
Shelby	1,403	58	0.11	184,440
Wabash	98,332	2,064	4.07	6,563,520
Washington	25,630	756	1.49	2,404,080
Wayne	215,056	5,661	11.16	18,001,980
White	250,419	7,102	14.00	22,584,360
Williamson	837	135	0.27	429,300
Total	2,827,842	50,724	100.00	\$161,302,320

a Subject to revision.
b In thousands of barrels.
c Average price estimated at \$3.18 per barrel.
d Champaign County produced less than 100 barrels of oil in 1969.

TABLE 10 - ILLINOIS STONE PRODUCTION BY REGIONS, 1969^{a,b}

Producing count and operations		Stone use	Tons	Value	Averag
		NORTH	JEST		
Carroll.	Ogle	Road and			
Henry	Rock Island	building	4,399,010	\$5,334,431	\$1.21
Jo Daviess	Stephenson	Agstone		868,975	1.57
Lee	Whiteside	All other	553,148		1.41
		All other	298,299	419,336	1.41
Mercer	Winnebago tions — 103	Total	5 250 457	\$6,622,742	\$1.26
Opera	C10ffs — 105		5,250,457	VO, 022, 742	71.20
Adams	Knox	WEST Road and	C .		
Brown	Mc Donough	building	2,086,853	\$3,053,774	\$1.46
Hancock				716,971	1.52
	Schuyler	Agstone All other	470,179	990,136	3.16
lenderson Opera	Warren tions - 24		313,814		
•		Tota1	2,870,846	\$4,760,881	\$1.66
		WEST SOUT	THWEST		
Ca lhoun	Madison	Road and		** ***	
Christian	Montgomery	building	2,728,548	\$4,664,701	\$1.71
Greene	Pike	Agstone	558,724	863,937	1.55
Jersey	Scott	All other	349,880	618,583	1.77
Macoupin Opera	tions - 28	Total	3,637,152	\$6,147,221	\$1.69
Opera	2010 - 20			70,177,1221	41.07
linton	Randolph	Road and	VEST		
ackson	St. Clair	building	5,303,471	\$8,561,200	\$1.61
ohnson	Union	Agstone	565,530	879,440	1.56
Monroe Pulaski	Washington	All other	1,798,668	2,887,886	1.61
	tions - 22	Total	7,667,669	\$12,328,526	\$1.61
		NORTHI	7A CT		
	V 4-11		TWO I		
Boone	Kendall	Road and	20 002 200	000 /05 000	61 /7
Cook	La Salle	building	20,003,300	\$29,485,088	\$1.47
De Kalb	McHenry	Agstone	576,118	793,752	1.38
Ou Page Kane	Will	All other	2,093,277	3,543,555	1.69
	tions - 23	Total	22,672,695	\$33,822,395	\$1.49
		EAST	r		
Kankakee		Road and			
Livingston		building	4,188,453	\$6,041,034	\$1.44
/ermilion		Agstone	802,540	1,198,382	1.49
		All other	140,556	352,143	2.51
Opera	tions — 10	Total	5,131,549	\$7,591,559	\$1.48
		CENTI	244		
ogan		Road and	WI L		
lenard		building	1,082,266	\$1,787,040	\$1.65
eoria		Agstone	197,829	364,965	1.84
		All other			_
0pera	tions — 5	Total	1,280,095	\$2,152,005	\$1.68
		EAST SOUT	TH FA ST		
lark	Fayette	Road and			
lay	Marion	building	1,262,742	\$2,437,456	\$1.93
oles	Shelby	Agstone	345,633	654,229	1.89
umberland		All other	<u> </u>	<u> </u>	_
Opera	tions - 10	Total	1,608,375	\$3,091,685	\$1.92
		COLUMNIA			
ardin		SOUTHI Road and	2001		
assac		building	988,221	\$1,228,667	\$1.24
Opera	tions - 6	Agstone	175,002	220,012	1.26
		All other	399,236	462,457	1.16
		Tota1	1,562,459	\$1,911,136	\$1.22
		COLUMN MA			
ounties - 60		STATE TO Road and	TVT9		
	tions - 231		42 042 944	642 502 201	61 /
	C10118 — 231	building	42,042,864	\$62,593,391	\$1.49
Opera					
Opera		Agstone	4,244,703	6,560,663	1.55
Opera		Agstone All other	4,244,703 5,393,730	9,274,096	1.72

 $^{^{\}rm a}_{\rm b}$ Based on U. S. Bureau of Mines figures. All values at the quarry. Commension stone and stone used for cement and lime not included. Summary of commercial stone production. Figure 3 shows regions and counties.

TABLE 11 - ILLINOIS COMMON SAND PRODUCTION BY REGIONS, 1969^a

Producing counties and operations		Sand use	Tons	Value	Averag per to
		NORTHWES	ST		
Bureau	Ogle				
Carroll	Rock Island	Paving	961,635	\$ 688,636	\$0.72
Henry	Stephenson	Building	1,159,183	1,096,600	0.95
Jo Daviess	Whiteside	All other	396,641	218,408	0.55
Lee	Winnebago				
Operations		Total	2,517,459	\$2,003,644	\$0.80
		WEST			
Adams	Schuyler	Paving	135,669	\$ 103,971	\$0.77
Brown	,	Building	88,160	101,214	1.15
Fulton		All other	109,404	77,648	0.71
Operations	9				
operacion	,	Total	333,233	\$ 282,833	\$0.85
		WEST SOUTH			
Bond	Pike	Paving	228,260	\$ 241,135	\$1.06
Madison	Sangamon	Building	938,954	915,926	0.98
Morgan	Scott	All other	208,382	184,045	0.88
Operations		Total	1,375,596	\$1,341,106	\$0.97
		Iotai	1,373,370	\$1,541,100	ŞU.97
		SOUTHWES			
lexander	Randolph	Paving	140,122	\$ 125,620	\$0.90
Clinton	St. Clair	Building	315,766	314,081	0.99
Jackson	Union	All other	121,572	106,142	0.87
Pulaski		Total	577,460	\$ 545,843	\$0.95
Operations	: - 8	Iotai	377,400	9 545,045	YU. 93
		CENTRAI			
De Witt	Mason				
Logan	Peoria	Paving	832,705	\$ 781,920	\$0.94
McLean	Tazewell	Building	668,607	718,431	1.07
lacon	Woodford	All other	315,216	240,496	0.76
Marshall	0.0	Tota1	1,816,528	\$1,740,847	\$0.96
Operations	- 29	NORMIEA			
Boone	Kane	NORTHEAS	r		
Cook	Lake	Paving	5,221,889	\$5,723,122	\$1.10
De Kalb	La Salle	Building	2,524,579		1.11
	McHenry			2,796,036	
Ou Page		All other	897,087	696,765	0.78
Grundy Operations	Will - 54	Total	8,643,555	\$9,215,923	\$1.07
		TA OFF			
Champaign	Kankakee	EAST Paving	541,630	\$ 547,027	\$1.01
ford	Livingston	Building	113,366	107,943	0.95
roquois	Vermilion	All other	57,616	34,471	0.60
Operations		Total			
Operations	- 17	10(41	712,612	\$ 689,441	\$0.97
1 - 1		EAST SOUTH			
lark	Effingham	Paving	302,379	\$ 293,396	\$0.97
Coles	Fayette	Building	131,600	104,720	0.80
rawford	Lawrence	All other	191,365	119,340	0.62
umberland	She1by	Total	625,344	\$ 517,456	\$0.83
Operations	– 17	10141	023,344	\$ 517,456	\$0.83
		SOUTHEAS	T		
dwards	Wabash	Paving	456,250	\$ 405,000	\$0.89
allatin	White	Building	423,248	456,198	1.08
lassac		All other	112,013	77,409	0.69
Operations	- 10	Total	991,511	\$ 938,607	\$0.95
				7 750,007	QU.93
		STATE TOT			
Counties - 65	100	Paving	8,820,539	\$8,909,827	\$1.01
Operations	- 189	Building	6,363,463	6,611,149	1.04
		All other	2,409,296	1,754,724	0.73
		Total	17,593,298	\$17,275,700	
					\$0.98

Based on U. S. Bureau of Mines figures. All values at the pit. Summary of commercial sand production. Figure 3 shows regions and counties.

TABLE 12 - ILLINOIS GRAVEL PRODUCTION BY REGIONS, 1969

Producing co	ounties ions	Gravel	Tons	Value	Average
		use		Value	per ton
Bureau	Putnam	NORTH	EST		
Carroll	Rock Island	Paving	725,675	\$ 746,515	\$1.03
Jo Daviess	Stephenson	Building	886,223	988,666	1.12
Lee	Whiteside	All other	44,501	32,408	0.73
		All other			
Ogle (Winnebago Operations — 39	Total	1,656,399	\$1,767,589	\$1.07
		WEST			
Adams	Schuyler	Paving	337,818	\$ 525,373	\$1.56
Brown	•	Building	80,670	140,548	1.74
Fulton		All other	<u> </u>	<u>-</u>	_
(Operations — 8	Total	418,488	\$ 665,921	\$1.59
		WEST SOU	THWEST		
Bond	Scott	Paving	159,073	\$ 212,916	\$1.34
Pike		Building	161,629	257,422	1.59
Sangamon		All other	34,008	41,063	1.21
	Operations — 9	Total	354,710	\$ 511,401	\$1.44
		COLUMN			
Alexander	Union	SOUTHV Paving	Z4,595	\$ 16,898	\$0.69
Clinton	Uniton	Building	24,575	- 10,000	
Pulaski		All other	_	_ ,	_
(Operations — 4	Total	24,595	\$ 16,898	\$0.69
		CENTI	PΔT		
De Witt	Peoria	CIMIT	W.L		
Logan	Stark	Paving	2,396,764	\$3,247,555	\$1.35
McLean	Tazewell	Building	709,705	1,067,119	1.50
Macon	Woodford	All other	210,282	159,370	0.76
Marshall C	Operations — 48	Total	3,316,751	\$4,474,044	\$1.35
	,peracrons 40	NORTH	EAST		
Boone	Kenda11				
Cook	Lake				
De Kalb	La Salle	Paving	5,785,099	\$6,553,518	\$1.13
Du Page	McHenry	Building	6,371,318	5,712,791	0.90
Grundy	Will	All other	1,091,630	1,001,259	0.92
Kane	Operations - 73	Total	13,248,047	\$13,267,568	\$1.00
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	EAST			
Champaign	Kankakee	Paving	508,936	\$ 605,358	\$1.19
Ford	Livingston	Building	69,685	76,608	1.10
Iroquois	Vermilion	All other			
(Operations — 25	Total	578,621	\$ 681,966	\$1.18
		EAST SO	JTHEAST		
Clark	Fayette	Paving	767,951	\$ 834,590	\$1.09
Coles	Lawrence	Building	101,050	125,255	1.24
Crawford	Moultrie	All other	149,485	95,401	0.64
Cumberland	Shelby				
	Operations - 17	Total	1,018,486	\$1,055,246	\$1.04
		SOUTH	EAST		
Edwards	Wabash	Paving	615,137	\$ 564,227	\$0.92
Gallatin	White	Building	36,256	49,345	1.36
Massac		All other			
(Operations - 10	Total	651,393	\$ 613,572	\$0.94
		STATE :			
Counties — (61	Paving	11,321,048	\$13,306,950	\$1.18
	Operations — 233	Building	8,416,536	8,417,754	1.00
	SPETALIONS - 255	All other	1,529,906	1,329,501	0.87
		Total	21,267,490	\$23,054,205	\$1.08

 $^{^{\}rm a}_{\rm Based}$ on U. S. Bureau of Mines Figures. All values at the pit, $^{\rm b}_{\rm Summary}$ of commercial gravel production. Figure 3 shows regions and counties.

TABLE 13 - ILLINOIS SILICA SAND PRODUCTION, 1968-1969

	19	068	1969				
Silica sand use	Tons	Value	Tons	Value			
Glass sand	2,059,000	\$ 4,618,000	2,136,890	\$ 5,101,987			
Molding sand	1,024,000	3,716,000	1,149,621	4,282,548			
Other uses Ground silica sand c,d	829,000	5,071,000	795,228 313,211	3,550,171 2,836,213			
Total silica sand	3,912,000	\$13,405,000	4,394,950	\$15,770,919			

TABLE 14 - PRODUCTION OF ILLINOIS CLAY PRODUCTS, 1968-1969

	19	58	1969			
Clay products reported	Amount	Value	Amount	Value		
Face brick (number)	140,838,467	\$ 6,514,301	143,958,741	\$ 6,938,584		
Common brick (number)	136,249,312	4,608,331	123,298,257	3,671,564		
Drain and sewer tile (tons)	173,296	6,718,642	159,240	6,793,255		
Lightweight aggregate (tons)	727,533	3,158,580	539,750	3,203,803		
Other clay products		597,080		823,44		
Clay and silica refractories		8,874,009		12,511,04		
Pottery and whiteware		23,142,930	_	24,524,93		
Total		\$53,613,873		\$58,466,63		

TABLE 15 - FLUORSPAR SHIPPED AND CONSUMED, 1960-1969

	F	luorspar shipmen	ts	Fluorspar	Illinois shipments
Year	United States	Illinois	Illinois as percent of U.S.	consumed in United States	as percent of U.S. consumption
1960	229,782	134,529	58.5	643,759	20.9
1961	197,354	116,908	59.2	687,940	17.0
1962	206,026	132,830	64.5	652,888	20.3
1963	199,948	132,060	66.1	736,350	17.9
1964	217,137	127,454	58.7	831,561	15.3
1965	240,932	159,140	66.1	930,127	17.1
1966	253,068	176,175	69.6	1,065,124	16.5
1967	295,643	210,207	71.1	1,091,158	19.3
1968	252,411	188,325	74.6	1,243,414	15.1
1969	182,567	88,480	48.5	1,356,624	6.5

TABLE 16 - ILLINOIS ZINC AND LEAD PRODUCTION, 1960-1969

		Zinc		Lead					
Year ^b	Tons	Value	Average per ton	Tons	Value	Average per ton			
1960	29,550	\$7,623,900	\$258.00	3,000	\$702,000	\$234.00			
1961	26,795	6,162,850	230.00	3,430	706,580	206.00			
1962	27,413	6,304,990	230.00	3,610	664,240	184.00			
1963	20,337	4,677,510	230.00	2,901	626,616	216.00			
1964	13,800	3,753,600	272.00	2,180	571,160	262.00			
1965	18,314	5,347,688	292.00	3,005	937,560	312.00			
1966	15,192	4,405,680	290.00	2,285	690,756	302.00			
1967	20,416	5,652,374	277.00	2,384	667,520	280.00			
1968	18,182	4,909,140	270.00	1,467	387,641	264.00			
1969	13,765	4,019,400	292.00	791	235,700	298.00			

^aBased on U. S. Bureau of Mines figures. ^bBlast, engine, filtration, grinding, oil, other. ^cFor abrasives, ceramics, foundry, filler, chemical. ^dGround silica sand figures for 1968 not available for publication.

^aFluorspar figures, in tons, U. S. Bureau of Mines. ^bFluorspar consumed includes domestic and foreign material.

Based on U. S. Bureau of Mines figures.
Mine production of recoverable metal.

TABLE 17 - SUMMARY OF MINERALS PRODUCED BY ILLINOIS COUNTIES, 1969

This table is a convenient reference to the counties of Illinois producing any of 14 mineral products. The numbers show the position held by each county among all counties producing a selected mineral product.

Counties	Cement	Clay products	Coal	Crude oil	Fluorspar	Lead	Lime	Natural bonded molding sand	Common sand	Common gravel	Silica sand	Stone	Tripoli	Zinc
Adams Alexander Bond Boone Brown	_ _ _ _ _	_ _ _ _ _ 23	24 - - - -	38 - 31 - 40	_ _ _ _ _	- - - -	2 - - -		45 37 24 49 63	54 53 34 36 61	- - - -	16 - - 33 60	_ 1 _ _ _	- - - -
Bureau Calhoun Carroll Cass Champaign	- - - -	_ _ _ _	_ _ _ _	- - - - 43	- - - -	_ _ _ _	- - - -	- - - -	22 - 59 - 11	7 - 45 - 21	_ _ _ _	_ 56 35 _ _	_ _ _ _	- - - -
Christian Clark Clay Clinton Coles	- - - -	- - - -	5 	21 22 6 15 20	_ _ _ _	_ _ _ _	- - - -	_ _ _ _	- 40 - 38 28	_ 24 _ 56 44	_ _ _ _	53 23 45 51 26	_ _ _ _	_ _ _ _
Cook Crawford Cumberland De Kalb De Witt	- - - -	2 5 - -	- - - -	- 7 25 - 24	_ _ _ _	_ _ _ _	1 - - -	- - - -	8 27 35 20 46	10 14 42 28 22	- - - -	1 - 58 34 -	- - - -	- - - -
Douglas Du Page Edgar Edwards Effingham	_ _ _ _	- 7 - -	14 	33 - 30 16 19	_ _ _ _	_ _ _ _	_ _ _ _	- - - -	- 17 - 62 57	- 13 - 38 -	_ _ _ _	- 11 - -	- - - -	_ _ _ _
Fayette Ford Franklin Fulton Gallatin	_ _ _ _	22 - - - -	- 2 3 12	4 13 14	- - - -	_ _ _ _	_ _ _ _	3 - - - -	52 33 - 18 19	39 33 - 15 50	_ _ _ _	37 - - - -	_ _ _ _	_ _ _ _
Greene Grundy Hamilton Hancock Hardin	_ _ _ _	14 8 - -	- 18 - - -	- 8 42 -	- - - - 1	_ _ _ _ 2	_ _ _ _	- - - -	_ 2 _ - _	_ 55 _ _ _ _	_ _ _ _	30 - - 27 7	_ _ _ _	_ _ _ _ 2

TABLE 17 — Continued

Counties	Cement	Clay products	Coa1	Crude oil	Fluorspar	Lead	Lime	Natural bonded molding sand	Common sand	Common gravel	Silica sand	Stone	Tripoli	Zinc
Henderson	_	_	_	_	_	_	_	_	_	_	_	32	_	_
Henry	-	-	_	-	_	-	-	1	50	_	-	38	-	-
Iroquois Jackson	_	_	20	_	_	_	_	_	54 43	58 —	_	- 40	_	_
Jasper	_	_	_	11	_	_	_	_	-	_	_	40	_	_
Jefferson	_	-	6	12	_	-	_	_	-	_	_	_	_	_
Jersey Jo Daviess	_	_	_	_	_	_ 1	_	_	_ 30	– 57	_	50 25	-	1
Johnson	_	_	21	_	_	_	_	_	_		_	12	_	_
Kane	_	6		_	_	_	_	_	3	2	_	17	_	_
Kankakee		15	19						56	52		4		
Kenda 11	_	_	_		_	_	_	_	_	18	_	42	_	_
Knox	_	4	13	_	_	_	_	_	_	_	_	36	_	_
Lake	_	13	_	_	_	_	_	_	9	5	_	_	_	_
La Salle	1	1	-	-	-	-	-	-	16	12	1	⁻ 47	-	_
Lawrence	_	_		2	_	_	_	_	44	19	_	_	_	_
Lee	3	_	-	-	_	_	_	-	34	31	_	19	_	_
Livingston	_	21	-	-	-	-	-	_	65	35	_	5	_	_
Logan	_	_	-	_	-	-	-	-	31	27	-	43	_	_
McDonough	-	3	-	34	_	_	_	-	-	_	-	31	_	-
McHenry	_	_	_	_	_	_	_	_	1	1	_	59	_	_
McLean	_	_	-	-	-	-	-	-	23	8	_	_	_	_
Macon	_	_	_	36	-	_	_	-	21	25	_	_	-	_
Macoupin Madison	_	_ 11	_	37 26	_	_	_	_	_ 12	_	-	48	-	_
122413011		11	_	20	_	_	_	_	12	_	_	14	_	_
Marion	_	-	-	5	_	_	_	_	_	-	_	52	_	_
Marshall	_	_	-	-	-	-	-	-	39	17	_	-	_	_
Mason Massac	_ 2	_	-	_	-	-	-	-	53	-	-	_	-	_
Menard	-	_	_	_	_	_	_	_	14 —	51 —	_	55 24	_	_
Mercer	_	-	22	-	-	-	_	-	_	_	_	49	-	_
Monroe Montgomery	_	_	_ 9	- 41	_	-	_	_	_	_	_	39	-	-
Morgan	_	_	_	41	_	_	_	_	_ 47	_	_	10	_	_
Moultrie	_	_	_	39	_	_	_	_	4 <i>/</i>	- 48	_	_	_	_

TABLE 17 — Continued

Counties	Cement	Clay products	Coal	Crude oil	Fluorspar	Lead	Lime	Natural bonded molding sand	Common sand	Common gravel	Silica sand	Stone	Tripoli	Zinc
Ogle	_	_	- -	_	_	_	_	_	29	29	2	28	_	_
Peoria	-	-	11	_	_	_	-	_	7	4	_	21	_	_
Perry	-	_	1	35 —	_	_	_	_	-	_	_	_	_	_
Piatt Pike	_	_	_	_	_		_	_	- 61	_ 32	_	_ 18	_	_
rike		_	_	_	_	_	_	_	01	32	_	10	_	_
Pope	_	_	_	_	2	3	_	_	_	_	_	_	_	3
Pulaski	_	16	_	_	_	_	_	_	48	59	_	44	_	_
Putnam	_	_	_	_	_	_	_	_	_	41	_	_	_	_
Randolph	_	_	8	28	_	_		_	25	_	_	6	_	_
Richland	-	_	_	9	_	-	-	_	_	-	-	_	-	_
								_						
Rock Island	_	_	-,	_	_	_	_	2	6	26	-	9	_	_
St. Clair	_	20	4	29	-	_	-	-	26	-	-	3	_	_
Saline	_	_ 17	10	18	_	_	_	_	_	_	_	-	_	_
Sangamon	_	17	_	23	_	_	_	_	10 60	23 46	-	_ 57	_	_
Schuyler	_	_	_	_	_	_	_	_	60	40	_	57	_	_
Scott	_	18	_	_	_	_	_	_	64	60	_	46	_	_
She1by	_	_	_	32	_	_	_	_	41	30	_	54	_	_
Stark	_	_	15	_	_	_	_	_	_	47	_	_	_	_
Stephenson	_	-	_	_	_	_	_	_	32	40	_	20	_	_
Tazewell	_	19	_	_	_	_	_	_	13	6	_	-	_	_
** .														
Union	_	_ 12	_ 16	-	_	_	_	_	58	49	_	13	_	_
Vermilion Wabash	-			-	_	_	_	_	55	20	-	8	_	_
Warren	_	_ 9	-	10	_	_	_	_	36	37	_	_	_	_
Washington	_	9	_ 23	_ 17	_	_	_	_	_	_	-	22 29	_	_
Wayne	_	_	_	3	_	_	_	_	_	_	_		_	_
wayne	_	_	_	3	_	_	_	_	_	_	_	_	_	_
White	_	_	_	1	_	_	_	_	15	11	_	_	_	_
Whiteside	_	_	_	_	_	_	_	_	42	43	_	41	_	_
Will	_	10	17	_	_	_	_	_	4	3	_	2	_	_
Williamson	_	_	7	27	_	_	_	_	_	_	_	_	_	_
Winnebago	-	*****	_	_	_	_	_	_	5	9	_	15	_	_
Woodford	-	_	_	_	-	_	_	-	51	16	_	_	_	_

ILLINOIS STATE GEOLOGICAL SURVEY Urbana, Illinois 61801

FULL TIME STAFF January 1, 1971

JOHN C. FRYE, Ph.D., D.Sc., Chief Hubert E. Risser, Ph.D., Assistant Chief

G. R. Eadie, M.S., E.M., Administrative Engineer

Velda A. Millard, Fiscal Assistant to the Chief

Helen E. McMorris, Secretary to the Chief

Mary M. Sullivan, Research Assistant

GEOLOGICAL GROUP Jack A. Simon, M.S., Principal Geologist

M. L. Thompson, Ph.D., Principal Research Geologist R. E. Bergstrom, Ph.D., Coordinator, Environmental Geology Frances H. Alsterlund, A.B., Research Associate

COAL.

M. E. Hopkins, Ph.D., Geologist and Head Harold J. Gluskoter, Ph.D., Geologist William H. Smith, M.S., Geologist Neely H. Bostick, Ph.D., Associate Geologist Kenneth E. Clegg, M.S., Associate Geologist Heinz H. Damberger, D.Sc., Associate Geologist Russel A. Peppers, Ph.D., Associate Geologist Roger B. Nance, M.S., Assistant Geologist Hermann W. Pfefferkorn, D.Sc., Assistant Geologist Kenneth R. Cope, B.S., Research Assistant

STRATIGRAPHY AND AREAL GEOLOGY

Charles Collinson, Ph.D., Geologist and Head Elwood Atherton, Ph.D., Geologist T. C. Buschbach, Ph.D., Geologist Herbert D. Glass, Ph.D., Geologist Lois S. Kent, Ph.D., Associate Geologist Jerry A. Lineback, Ph.D., Associate Geologist David L. Gross, Ph.D., Assistant Geologist Alan M. Jacobs, Ph.D., Assistant Geologist Matthew J. Avcin, M.S., Research Assistant Rene Acklin, Technical Assistant

ENGINEERING GEOLOGY AND TOPOGRAPHIC MAPPING W. Calhoun Smith, Ph.D., Geologist in charge Paul B. DuMontelle, M.S., Associate Geologist Robert E. Cole, B.S., Research Assistant

CLAY RESOURCES AND CLAY MINERAL TECHNOLOGY W. Arthur White, Ph.D., Geologist and Head Bruce F. Bohor, Ph.D., Associate Geologist Cheryl W. Adkisson, B.S., Research Assistant

GEOLOGICAL RECORDS

Vivian Gordon, Head Hannah Kistler, Supervisory Assistant Sahar A. McCullough, B.Sc., Research Assistant Elizabeth A. Conerty, Technical Assistant Betty C. Cox, Technical Assistant Diane A. Heath, B.A., Technical Assistant Coradel R. Little, A.B., Technical Assistant Connie L. Maske, B.A., Technical Assistant Elizabeth Speer, Technical Assistant Jane A. White, Technical Assistant

INDUSTRIAL MINERALS

James C. Bradbury, Ph.D., Geologist and Head James W. Baxter, Ph.D., Geologist Richard D. Harvey, Ph.D., Geologist Norman C. Hester, Ph.D., Assistant Geologist

GEOLOGICAL SAMPLES LIBRARY

Robert W. Frame, Superintendent J. Stanton Bonwell, Supervisory Assistant Charles J. Zelinsky, Supervisory Assistant Eugene W. Meier, Technical Assistant Jannice P. Richard, Clerk-Stenographer II

Anita E. Bergman, B.S., Technical Assistant

CHEMICAL GROUP

Glenn C. Finger, Ph.D., Principal Chemist N. F. Shimp, Ph.D., Coordinator, Environmental Research

G. Robert Yohe, Ph.D., Senior Chemist Thelma J. Chapman, B. A., Research Assistant

MINERALS ENGINEERING

R. J. Helfinstine, M.S., Mechanical Engineer and Head H. P. Ehrlinger III, M.S., E.M., Assoc. Minerals Engineer Lee D. Arnold, B.S., Research Assistant Walter E. Cooper, Technical Associate Robert M. Fairfield, Supervisory Assistant John P. McClellan, Technical Assistant (on leave) Edward A. Schaede, Technical Assistant (on leave)

GEOCHEMISTRY

G. C. Finger, Ph.D., Acting Head Donald R. Dickerson, Ph.D., Organic Chemist Josephus Thomas, Jr., Ph.D., Physical Chemist Richard H. Shiley, M.S., Associate Organic Chemist Robert R. Frost, Ph.D., Assistant Physical Chemist Ralph S. Boswell, Technical Assistant

(Chemical Group continued on next page)

GROUND-WATER GEOLOGY AND GEOPHYSICAL EXPLORATION

Robert E. Bergstrom, Ph.D., Geologist and Head Merlyn B. Buhle, M.S., Geologist Keros Cartwright, M.S., Associate Geologist George M. Hughes, Ph.D., Associate Geologist John P. Kempton, Ph.D., Associate Geologist Leon R. Follmer, Ph.D., Assistant Geologist Manoutchehr Heidari, Ph.D., Assistant Engineer Paul C. Heigold, Ph.D., Assistant Geophysicist Kemal Piskin, M.S., Assistant Geologist Philip C. Reed, A.B., Assistant Geologist Frank B. Sherman, Jr., M.S., Assistant Geologist Ross D. Brower, M.S., Jr. Assistant Geologist

Jean I. Larsen, M.A., Jr. Assistant Geologist Jean E. Peterson, B.A., Research Assistant

David D. Brockman, Technical Assistant

OIL AND GAS

Donald C. Bond, Ph.D., Head Lindell H. Van Dyke, M.S., Geologist Thomas F. Lawry, B.S., Associate Petroleum Engineer R. F. Mast, M.S., Associate Petroleum Engineer Wayne F. Meents, Associate Geological Engineer David L. Stevenson, M.S., Associate Geologist Hubert M. Bristol, M.S., Assistant Geologist Richard H. Howard, M.S., Assistant Geologist Jacob Van Den Berg, M.S., Assistant Geologist Marjorie E. Melton, Technical Assistant

ANALYTICAL CHEMISTRY

Neil F. Shimp, Ph.D., Chemist and Head William J. Armon, M.S., Associate Chemist Charles W. Beeler, M.A., Associate Chemist Rodney R. Ruch, Ph.D., Associate Chemist John A. Schleicher, B.S., Associate Chemist Larry R. Camp, B.S., Assistant Chemist Dennis D. Coleman, M.S., Assistant Chemist David B. Heck, B.S., Assistant Chemist

L. R. Henderson, B.S., Assistant Chemist F. E. Joyce Kennedy, Ph.D., Assistant Chemist Lawrence B. Kohlenberger, B.S., Assistant Chemist John K. Kuhn, B.S., Assistant Chemist Joan D. Hauri, B.A., Special Research Assistant Fei-fei C. Lee, M.S., Special Research Assistant Paul E. Gardner, Technical Assistant George R. James, Technical Assistant

MINERAL ECONOMICS GROUP

Hubert E. Risser, Ph.D., Principal Mineral Economist

W. L. Busch, A.B., Economic Analyst

 $\label{eq:Robert L. Major, M.S., Assistant Mineral Economist Irma E. Samson, Clerk Typist II$

ADMINISTRATIVE GROUP George R. Eadie, M.S., E.M., Head Paula A. Grabenstein, B.S., Research Assistant

EDUCATIONAL EXTENSION

David L. Reinertsen, A.M., Geologist and Acting Head George M. Wilson, M.S., Extension Geologist William E. Cote, M.S., Assistant Geologist Myrna M. Killey, B.A., Research Assistant

PUBLICATIONS

Betty M. Lynch, B.Ed., Technical Editor
Mary Ann Noonan, A.M., Technical Editor
Jane E. Busey, B.S., Assistant Technical Editor
Dorothy Rae Weldon, Editorial Assistant
Marie L. Martin, Geologic Draftsman
Penelope M. Kirk, Assistant Geologic Draftsman
Ilona Sandorfi, Assistant Geologic Draftsman
Patricia A. Whelan, B.F.A., Asst. Geologic Draftsman
William Dale Farris, Scientific Photographer
Dorothy H. Huffman, Technical Assistant

GENERAL SCIENTIFIC INFORMATION
Peggy H. Schroeder, B.A., Research Assistant
Florence J. Partenheimer, Technical Assistant

SPECIAL TECHNICAL SERVICES
Ernest R. Adair, Technical Assistant
David B. Cooley, Administrative Assistant

Wayne W. Nofftz, Distributions Supervisor Glenn G. Poor, Research Associate (on leave) Merle Ridgley, Instrument Specialist James E. Taylor, Automotive Mechanic Donovon M. Watkins, Technical Assistant

FMFRITI

M. M. Leighton, Ph.D., D.Sc., Chief, Emeritus J. S. Machin, Ph.D., Principal Chemist, Emeritus O. W. Rees, Ph.D., Prin. Research Chemist, Emeritus W. H. Voskuil, Ph.D., Prin. Mineral Economist, Emeritus G. H. Cady, Ph.D., Senior Geologist, Emeritus A. H. Bell, Ph.D., Geologist, Emeritus George E. Ekblaw, Ph.D., Geologist, Emeritus H. W. Jackman, M.S.E., Chemical Engineer, Emeritus J. E. Lamar, B.S., Geologist, Emeritus L. D. McVicker, B.S., Chemist, Emeritus Enid Townley, M.S., Geologist, Emerita Lester L. Whiting, M.S., Geologist, Emeritus H. B. Willman, Ph.D., Geologist, Emeritus Juanita Witters, M.S., Physicist, Emerita B. J. Greenwood, B.S., Mechanical Engineer, Emeritus

FINANCIAL OFFICE

Velda A. Millard, in charge Marjorle J. Hatch, Clerk IV Pauline Mitchell, Account Clerk Virginia C. Smith, B.S., Account Clerk

CLERICAL SERVICES

Nancy J. Hansen, Clerk-Stenographer III Hazel V. Orr, Clerk-Stenographer III Mary K. Rosalius, Clerk-Stenographer III Lucy Wagner, Clerk-Stenographer II Jane C. Washburn, Clerk-Stenographer II Francie W. Doll, Clerk-Stenographer I Janette L. Hall, Clerk-Stenographer I Edna M. Yeargin, Clerk-Stenographer I Sharon K. Zindars, Clerk-Stenographer I JoAnn L. Lynch, Clerk-Typist II Pauline F. Tate, Clerk-Typist II Judith Ann Muse, Clerk-Typist I

TECHNICAL RECORDS
Miriam Hatch, Supervisor
Carol E. Fiock, Technical Assistant
Hester L. Nesmith, B.S., Technical Assistant

LIBRARY

Linda K. Clem, B.S., Assistant Librarian

RESEARCH AFFILIATES AND CONSULTANTS

Richard C. Anderson, Ph.D., Augustana College D. Bryan Blake, Ph.D., University of Illinois W. F. Bradley, Ph.D., University of Texas Richard W. Davis, Ph.D., Southern Illinois University John P. Ford, Ph.D., Eastern Illinois University Donald L. Graf, Ph.D., University of Illinois S. E. Harris, Jr., Ph.D., Southern Illinois University W. Hilton Johnson, Ph.D., University of Illinois Harry V. Leland, Ph.D., University of Illinois A. Byron Leonard, Ph.D., University of Kansas Lyle D. McGinnis, Ph.D., Northern Illinois University I. Edgar Odom, Ph.D., Northern Illinois University T. K. Searight, Ph.D., Illinois State University George W. White, Ph.D., University of Illinois

Topographic mapping in cooperation with the United States Geological Survey.

Illinois State Geological Survey Circular 455 24 p., 3 figs., 17 tables, 3100 cop., 1971 Urbana, Illinois 61801

CIRCULAR 455

ILLINOIS STATE GEOLOGICAL SURVEY

URBANA 61801