


ILLINOIS STATE GEOLOGICAL SURVEY



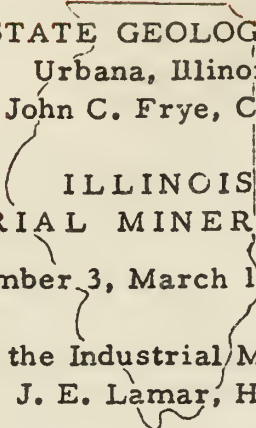
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MAR 23 1956



ILLINOIS STATE GEOLOGICAL SURVEY
Urbana, Illinois
John C. Frye, Chief

ILLINOIS
INDUSTRIAL MINERALS NOTES

Number 3, March 15, 1956

Prepared by the Industrial Minerals Division
J. E. Lamar, Head

This issue of Industrial Minerals Notes consists of two capsule reports, one dealing with the industrial mineral industry of Illinois in 1955 and the other with trace elements and potash in some Illinois gravels.

The Industrial Minerals Industry in Illinois in 1955
W. H. Voskuil and W. L. Busch

Estimates of value of mineral production for Illinois indicate that 1955 was one of the most productive years on record. Production values of industrial minerals in general rose approximately 6 percent over values for 1954.

Production of stone, cement, lime, and structural sand and gravel is estimated to have increased between two and three million dollars in value during the year.

Clay products valued at 49 million dollars accounted for another 2 million dollars of the increased value of raw minerals. Clay products include such items as face and common brick, sewer pipe, flue pipe, drain and building tile, vitreous plumbing fixtures, glazed tile, and electrical porcelains. The metallurgical industries continued a brisk demand for various forms of special heat-resistant fire brick and silica brick.

Special sands, such as silica sand and natural bonded molding sand, also were in increased demand. Silica sand, which is the backbone of an extensive glass industry, is now used also by the oil industry in hydraulic fracture treatment of oil-bearing rock. Both silica sand and natural bonded molding sand go into molds for making metal castings, such as cylinder heads for automobile engines.

Fluorspar and metals, which had fallen off in value to less than 10 million dollars in 1954, are again in demand and their value climbed to 11 1/2 million dollars in 1955. Fluorspar still encounters competition from foreign mines, but the increased demand from the manufacturers of hydrofluoric acid and from the steel industry has brought a number of Illinois mines back into production.

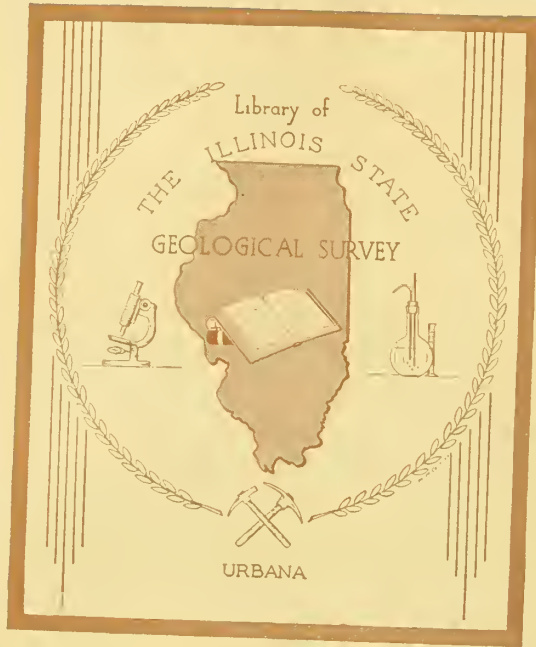
The estimates of value are based on raw minerals, or first marketable products. They represent values at the mines, pits, and quarries and do not

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Illinois State Geological Survey

Urbana, Illinois, U.S.A.

Production of minerals for Illinois has increased steadily for the past several years as shown. Production of lead, zinc, and copper has increased approximately 5 percent over the last five years. Production of iron has increased approximately 10 percent over the last five years. Production of coal has increased approximately 15 percent over the last five years. Production of oil has increased approximately 20 percent over the last five years. Production of gas has increased approximately 25 percent over the last five years. Production of other minerals has increased approximately 30 percent over the last five years.

The value of minerals produced in Illinois has increased steadily for the past several years as shown. The value of lead, zinc, and copper has increased approximately 10 percent over the last five years. The value of iron has increased approximately 15 percent over the last five years. The value of coal has increased approximately 20 percent over the last five years. The value of oil has increased approximately 25 percent over the last five years. The value of gas has increased approximately 30 percent over the last five years. The value of other minerals has increased approximately 35 percent over the last five years.

The value of minerals produced in Illinois has increased steadily for the past several years as shown. The value of lead, zinc, and copper has increased approximately 10 percent over the last five years. The value of iron has increased approximately 15 percent over the last five years. The value of coal has increased approximately 20 percent over the last five years. The value of oil has increased approximately 25 percent over the last five years. The value of gas has increased approximately 30 percent over the last five years. The value of other minerals has increased approximately 35 percent over the last five years.

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take into account the value added by further refining, processing, manufacturing, or transporting.

Estimated Value of 1955 Industrial Minerals

Stone and stone products: limestone, dolomite, cement, lime	\$ 53,800,000
Clay and clay products	49,000,000
Sand and gravel: structural or common sand and gravel; special sands	23,700,000
Fluorspar and metals (zinc, lead, and silver)	11,500,000
Total	<u>\$138,000,000</u>

Trace Elements and Potash in Some Illinois Gravels

J. E. Lamar and R. S. Shrode

In recent years attention has been called to the fact that certain kinds of slags and rocks that generally are considered relatively insoluble do none the less serve to reduce soil acidity or to contribute elements to the soil that benefit plant growth. Greensand has long been used in some places as a source of potassium and lately it is reported that pulverized granite has been proposed as a source of the same element, the potassium presumably deriving from potash feldspar in the granite.

Most Illinois gravels are composed predominately of limestone and dolomite pebbles, but some contain a considerable percentage of igneous rock pebbles, including granite. A brief investigation was made, therefore, to determine the potash and trace element content of selected samples, not primarily with the thought that the gravels, if pulverized, would in themselves serve as commercial fertilizers, but to obtain data from which specialists in the field of fertilizer materials could determine whether some gravels may have merit as a combined fertilizer and agricultural limestone. If this were possible it might afford an outlet for some gravels or for certain sizes of gravel that are unavoidably produced during the operation of some gravel deposits in quantities in excess of demand.

Seven gravel deposits believed to be among those most likely to have a high igneous rock content were sampled. Results of pebble counts are given in table 1. The three samples that contained the largest percentage of igneous rock were chosen for further study. Two of the samples, SL89 and SL132, came from central Illinois, and sample SL122 from northwestern Illinois. Each sample was sieved to four different sizes for analysis in order to determine how potash and trace element content varied with gravel size.

Analyses were made spectrographically with the high voltage A.C. arc and results are given in tables 2 and 3, together with figures for the limits of detection. These figures indicate the smallest amount of an element that could be detected by the analytical procedures used. As the gravel was

the commonest and best known of the...

International Conference

On the 20th day of May 1904...

Section I. General Principles

Article 1. The purpose of the...

crushed in a laboratory jaw crusher with stellite-faced plates, some, probably slight, addition of chromium, cobalt, and tungsten may have resulted from the plates. Among the elements sought, none of the following were present in sufficiently large amounts to be recognized within the limits of detection employed: antimony, beryllium, bismuth, cadmium, gallium, germanium, gold, indium, mercury, molybdenum, columbium, phosphorus, platinum, silver, thallium, tin, vanadium, tungsten, zinc, and zirconium. The limits of detection of molybdenum, phosphorous, and zinc, which may be agriculturally significant, were respectively .01, 1.0, and .02 percent.

Results of calcium carbonate equivalent tests to indicate the quantity of limestone and dolomite in the 3 samples are given in table 4.

It is concluded from the data given that some Illinois gravels contain appreciable amounts of potash and of the agriculturally significant trace elements boron, copper, manganese, and possible others. It seems likely that those gravels that contain the largest percentage of light-colored igneous rock pebbles, such as granite and syenite, will be higher in potash and, conversely, that the high limestone and dolomite gravels will be relatively low in potash. Whether a pulverized gravel may have significance as a combined liming and fertilizing material in any given area depends upon a great many factors which are not of a geological nature and, therefore, beyond the scope of this study. The needs of different soils, the rate of availability of the potash and trace elements in the gravel, and the economics of pulverizing gravel for agricultural use all are factors to be considered.

Table 1. - Pebble Counts of 1/2 by 1 Inch Fraction of Samples

Sample	Percent by number of pebbles			
	Light-colored igneous pebbles*	Dark-colored igneous pebbles†	Limestone and dolomite	Miscellaneous pebbles**
Northern Illinois				
SL103	9	5	76	10
SL105	0	0	92	8
SL111	6	2	72	20
SL116	8	4	72	16
Central Illinois				
SL89	14	5	40	41
SL132	14	7	43	36
Northwestern Illinois				
SL122	42	12	8	38

* Granites and similar rocks.

† Traprock, basalt, peridotite, and similar rocks.

** Siltstone, quartz, chert, and unidentified rocks.

Table 2. - Potash and Trace Element Content in Percent by Weight*

Sample and Size (inches)	Elements									
	Potash**	Potassium	Boron	Cobalt	Copper	Manganese	Barium	Chromium	Lead	Titanium
SL89										
- 1/8	1.42	1.18	.006	.002	.014	.032	.04	.002	.024	.20
1/8 x 1/4	1.17	.97	.006	.002	.006	.046	.04	.002	.014	.20
1/4 x 1/2	1.23	1.02	.008	.002(?)	.001	.044	.04	.004	.013	.20
1/2 x 1	1.17	.97	.006	.002	.008	.036	.04	.004	.007	.20
SL132										
- 1/8	1.54	1.28	.010	.002	.060	.026	.04	.002	.036	.22
1/8 x 1/4	1.73	1.44	.006	.002	.016	.076	.04	.004	.002(?)	.20
1/4 x 1/2	1.28	1.06	.006	.002	.006	.092	.04	.006	.003	.20
1/2 x 1	1.54	1.28	.006	.002	.008	.094	.02	.010	.005	.20
SL122										
- 1/8	1.87	1.55	.006	.002	.001	.014	.04	.002	.010	.26
1/8 x 1/4	3.02	2.51	.006	.005(?)	.006	.067	.10	.008	.012	.27
1/4 x 1/2	3.16	2.62	n.d†	.002	.011	.068	.08	.010	.016	.34
1/2 x 1	3.79	3.15	n.d	.005(?)	.005	.043	.06	.010	.010	.21
Limit of detection		0.1	.006	.002	.002	.003	.02	.002	.002	.2

* Analyses by Juanita Witters, Geochemistry Section, Illinois State Geological Survey.

** Calculated from potassium.

† Not detected.

The first part of the report deals with the general situation in the country. It is noted that the population is increasing rapidly, and that the government is making every effort to improve the living conditions of the people. The report also mentions the progress made in the various branches of industry and agriculture.

In the second part, the report discusses the financial situation of the country. It is stated that the government has managed to maintain a balanced budget, and that the public debt is being gradually reduced. The report also mentions the progress made in the various branches of industry and agriculture.

The third part of the report deals with the social situation in the country. It is noted that the government is making every effort to improve the living conditions of the people, and that the various social services are being expanded. The report also mentions the progress made in the various branches of industry and agriculture.

Year	Population	Industry	Agriculture	Finance	Social
1918	10,000,000	100	100	100	100
1919	10,500,000	110	110	110	110
1920	11,000,000	120	120	120	120
1921	11,500,000	130	130	130	130
1922	12,000,000	140	140	140	140
1923	12,500,000	150	150	150	150
1924	13,000,000	160	160	160	160
1925	13,500,000	170	170	170	170
1926	14,000,000	180	180	180	180
1927	14,500,000	190	190	190	190
1928	15,000,000	200	200	200	200
1929	15,500,000	210	210	210	210
1930	16,000,000	220	220	220	220
1931	16,500,000	230	230	230	230
1932	17,000,000	240	240	240	240
1933	17,500,000	250	250	250	250
1934	18,000,000	260	260	260	260
1935	18,500,000	270	270	270	270
1936	19,000,000	280	280	280	280
1937	19,500,000	290	290	290	290
1938	20,000,000	300	300	300	300
1939	20,500,000	310	310	310	310
1940	21,000,000	320	320	320	320
1941	21,500,000	330	330	330	330
1942	22,000,000	340	340	340	340
1943	22,500,000	350	350	350	350
1944	23,000,000	360	360	360	360
1945	23,500,000	370	370	370	370
1946	24,000,000	380	380	380	380
1947	24,500,000	390	390	390	390
1948	25,000,000	400	400	400	400
1949	25,500,000	410	410	410	410
1950	26,000,000	420	420	420	420

Table 3. - Potash and Trace Element Content in Pounds per Ton

Sample and Size (inches)	Elements									
	Potash*	Potas- sium	Doron	Cobalt	Copper	Manga- nese	Bar- ium	Chrom- ium	Lead	Titan- ium
SL89										
- 1/8	28.4	23.6	.12	.04	.28	.6	.3	.04	.48	4
1/8 x 1/4	23.4	19.4	.12	.04	.12	.9	.3	.04	.28	4
1/4 x 1/2	24.6	20.4	.16	.04(?)	.02	.9	.3	.08	.26	4
1/2 x 1	23.4	19.4	.12	.04	.16	.7	.3	.08	.14	4
SL132										
- 1/8	30.8	25.6	.20	.04	1.2	.5	.8	.04	.72	4
1/8 x 1/4	34.6	28.8	.12	.04	.32	1.5	.3	.03	.04	4
1/4 x 1/2	25.6	21.2	.12	.04	.12	1.8	.8	.12	.06	4
1/2 x 1	30.8	25.6	.12	.04	.16	1.9	.4	.20	.1	4
SL122										
- 1/8	37.4	31.0	.12	.04	.02	.3	.3	.04	.20	5
1/8 x 1/4	60.4	50.2	.12	.10(?)	.12	1.3	2.0	.16	.24	5
1/4 x 1/2	63.2	52.4	n.d.†	.04	.22	1.4	1.6	.20	.32	17
1/2 x 1	75.8	63.0	n.d.	.10(?)	.1	.9	1.2	.20	.20	4
Limit of detection		2.	.12	.04	.004	.6	.4	.04	.04	4

* Calculated from potassium.

† Not detected.

Table 4. - Neutralizing Value of Gravel

Sample	Calcium carbonate equivalent (percent)
1/4 x 1/2 inch gravel	
SL89	42
SL132	51
SL122	5
1/2 x 1 inch gravel	
SL89	40*
SL132	43*
SL122	8*

* Estimated; based on pebble counts.

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