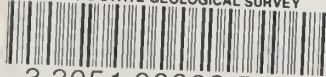



ILLINOIS STATE GEOLOGICAL SURVEY



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STATE OF ILLINOIS  
DWIGHT H. GREEN, *Governor*  
DEPARTMENT OF REGISTRATION AND EDUCATION  
FRANK G. THOMPSON, *Director*

DIVISION OF THE  
STATE GEOLOGICAL SURVEY  
M. M. LEIGHTON, *Chief*  
URBANA

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CIRCULAR NO. 87

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Illinois' Mineral Resources, Mapped By  
Geological Survey, Important in War

By  
M. M. LEIGHTON, *Chief*

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URBANA, ILLINOIS

1942





# Illinois' mineral resources, mapped by Geological Survey, important in War

By

*The Chief of the Illinois State Geological Survey Division*

M. M. LEIGHTON

ITS FERTILE PLAINS AND ITS RICH MINERAL DEPOSITS place opportunities and responsibilities upon Illinois in the war effort. Food, raw materials, and manufactured products for the nation's vigorous prosecution of the war will flow from this little domain, centrally located and protected within the continent.

Petroleum and petroleum products have unquestioned importance. Fortunately for the State and country, the new Illinois oil fields were discovered in time for this emergency. In 1941 Illinois maintained its fourth place among the oil-producing states, being exceeded only by Texas, California, and Oklahoma. Its total production during 1941 amounted to 133,750,000 barrels as compared with 147,647,000 barrels in 1940. By the end of 1941 more than 1,100 producing wells had been drilled in the new fields. During the last year 44 new pools located in 20 counties were discovered and extensions were made to the following pools:

Benton, Benton North, Bone Gap, Bonpas West, Boyleston, Centerville East, Clay City Consolidated, Dix, Herald, Hoodville, Iola, Irvington, Johnsonville, Mt. Carmel, Mason, Maunie South, Mill Shoals, New Harmony South, New Harmony Consolidated, Noble, North Boos, Parkersburg, Roland, Sailor Springs, Sims, Stokes, Walpole, Woburn, and Woodlawn. (See Tables I and II.)

## *Coal to Play an Essential Part*

The increase in production capacity of industrial plants will require additional tonnages from the coal mines of Illinois. Complete figures are not yet available for the coal produced in the United States in 1941, but United States government figures given in Table III cover the period from 1937-1940, inclusive.

New war plants in Illinois have not yet reached the State's quota, and it is expected that during 1942 there will be a considerable increase in coal production resulting from greater war activity. The St. Louis smoke elimination ordinance has had a depressive effect on the mining industry of the Illinois area adjacent to that city.

The trend of mechanization in Illinois coal mines over the period 1928-39, inclusive, is shown in Table IV.

*Left, this gusher opened the Storms oil and gas pool in White County*

Table 1: New Pools in Illinois in 1941

Field	County	Discovery well		
		Producing formation	Depth to top, ft.	Initial production, bbls.
Alma.....	Marion.....	Rosiclare sandstone.....	2,070	439
Benton.....	Franklin.....	Tar Springs sandstone.....	2,111	374
Benton North.....	Franklin.....	Rosiclare sandstone.....	2,789	380
Bone Gap.....	Edwards.....	McClosky limestone.....	3,266	46
Bonpas.....	Richland.....	McClosky limestone.....	3,118	260
Bonpas West.....	Richland.....	McClosky limestone.....	3,144	940
Boulder.....	Clinton.....	Devonian limestone.....	2,570	17
Bungay.....	Hamilton.....	Aux Vases sandstone.....	3,272	25
Carlinville North.....	Macoupin.....	Lower Pennsylvanian sandstone.....	436	10
Centerville East.....	White.....	Cypress sandstone.....	2,887	60
Clay City West.....	Clay.....	McClosky limestone.....	3,064	3,608
Cooks Mills.....	Coles.....	Aux Vases sandstone.....	1,830	30
Dahlgren.....	Hamilton.....	McClosky limestone.....	3,337	132
Eldorado.....	Saline.....	McClosky limestone.....	2,943	92
Elkville.....	Jackson.....	Bethel sandstone.....	2,000	5
Ellery.....	Edwards.....	McClosky limestone.....	3,341	62
Epworth.....	White.....	Palestine sandstone.....	2,099	90
Grayville West.....	White.....	Cypress sandstone.....	2,853	53
Geff.....	Wayne.....	McClosky limestone.....	3,135	62
Inman North.....	Gallatin.....	McClosky limestone.....	-----	40
Johnsonville.....	Wayne.....	McClosky limestone.....	2,992	2,406
Lakewood.....	Shelby.....	Aux Vases sandstone.....	1,723	37
Maunie.....	White.....	Palestine sandstone.....	2,012	35
Maunie North.....	White.....	Bethel sandstone.....	2,824	20
Maunie South.....	White.....	Aux Vases sandstone.....	2,841	141
Mayberry.....	Wayne.....	McClosky limestone.....	3,352	75
New Harmony South.....	White.....	Waltersburg sandstone.....	2,218	112
New Haven.....	White.....	Tar Springs sandstone.....	2,115	107
Parkersburg.....	Richland.....	McClosky limestone.....	3,117	1,459
Patoka East.....	Marion.....	Cypress sandstone.....	1,349	48
Patton.....	Wabash.....	McClosky limestone.....	2,309	170
Posey.....	Clinton.....	Cypress sandstone.....	1,105	29
Ruark.....	Lawrence.....	Buchanan sandstone.....	1,514	57
Rural Hill.....	Hamilton.....	McClosky limestone.....	3,188	794
St. Francisville East.....	Lawrence.....	Bethel sandstone.....	1,747	40
St. Paul.....	Fayette.....	Bethel sandstone.....	1,876	41
Stringtown.....	Richland.....	McClosky limestone.....	3,028	190
Ste. Marie.....	Jasper.....	McClosky limestone.....	2,832	500
Sailor Springs.....	Clay.....	Tar Springs sandstone.....	2,327	292
Sims.....	Wayne.....	McClosky limestone.....	3,158	240
South Lawrence.....	Lawrence.....	Buchanan sandstone.....	1,369	25
Walpole.....	Hamilton.....	Aux Vases sandstone.....	3,053	53
West Frankfort.....	Franklin.....	Tar Springs sandstone.....	2,040	31
Xenia.....	Clay.....	Aux Vases sandstone.....	2,786	44

Illinois coal is processed in the Curran-Knowles ovens located at West Frankfort and Millstadt for coke manufacture, apparently on an increasing scale although figures are not available since 1939.

#### *Geological Survey Furthers Its Coal Research*

By the end of 1940 the Geological Survey had completed its new Applied Research Laboratory and installed a specially designed briquetting press for making smokeless briquets at elevated temperatures and pressures without the use of a binder. The preheater is under construction and upon its completion the experimental work will proceed. Already the Survey's discovery that fine-coal waste contains a smokeless ingredient has found commercial application, and commercial production by a major coal company is now in effect using starch and a small amount of asphalt for a binder.

The Applied Research Laboratory is also being equipped for large-scale testing of ways in which better stoker fuel can be prepared, and botanical and chemical researches are being conducted on the nature of coal in order to find ways to extend its use. The mapping of the Herrin (No. 6) coal bed is being extended for use in protecting the safety of future coal mining from oil-well drilling.

Table II: Number of producing wells by county and field at close of 1941

County and field	Producing wells	County and field	Producing wells	County and field	Producing wells
<i>Bond</i> : Sorrento.....	1	<i>Hamilton</i> : Hoodville.....	155	<i>Wabash</i> : Patton.....	4
Woburn.....	27	Rural Hill.....	94	<i>Wabash, Lawrence</i> .....	94
<i>Clay</i> : Clay City West.....	2	Walpole.....	25	Lancaster.....	23
Flora.....	18	<i>Jackson</i> : Elkville.....	1	<i>Washington</i> : Cordes.....	128
Iola.....	3	<i>Jasper</i> : Hidalgo.....	1	Dubois.....	9
Saylor Springs.....	25	North Boes.....	44	Irrington.....	74
Xenia.....	1	Ste. Marie.....	3	McKale.....	6
<i>Clay, Wayne</i> : Clay City Consolidated.....	677	<i>Jefferson</i> : Cravat.....	11	<i>Wayne</i> : Barnhill.....	68
<i>Clinton</i> : Boulder gas.....	1	Dix.....	76	Poyleston.....	100
Hoffman.....	44	Roads.....	10	Cline.....	45
Posey.....	2	Woodlawn.....	137	Goldengate.....	5
West Centralia.....	6	<i>Lawrence</i> : Ruark.....	1	Jeff.....	1
<i>Clinton, Marion</i> : Centralia.....	791	Russellville gas.....	48	Johnsonville.....	217
<i>Coles</i> : Cooks Mills.....	1	St. Francisville East.....	3	Leech Twp.....	14
<i>Edwards</i> : Albion.....	79	South Lawrence.....	7	Mt. Erie.....	1
Bone Gap.....	4	<i>Macon</i> : Carlisle North.....	3	Mayberry.....	2
Cowling.....	12	<i>Marion</i> : Alma.....	2	North Aden.....	61
<i>Edwards, Wayne</i> : Ellery.....	2	Patoka.....	114	Rinard.....	1
Grayville.....	4	Patoka (East).....	56	Sims.....	4
<i>Effingham</i> : Mason.....	17	Salem.....	2,379	<i>Wayne, Hamilton</i> : Aden.....	9
<i>Fayette, Effingham</i> : Louden.....	1,911	Tonti.....	56	<i>White</i> : Burnt Prairie.....	20
<i>Fayette</i> : St. James.....	182	<i>Marion, Clinton</i> : Fairman.....	24	Calvin.....	1
<i>Franklin</i> : Benton.....	222	<i>Montgomery</i> : Raymond.....	2	Carmi.....	1
Benton North.....	6	Waggoner.....	4	Centerville.....	5
Thompsonville.....	18	<i>Richland</i> : Bonpas.....	1	Centerville East.....	6
West Frankfort.....	1	Bonpas West.....	4	Epworth.....	4
Whittington.....	1	Dundas Consolidated.....	7	Grayville West.....	3
<i>Gallatin</i> : Inman.....	38	Noble.....	233	Herald.....	5
Inman East.....	2	Olney.....	34	Iron.....	64
Junction.....	14	Schnell.....	4	Maunie.....	3
Omaha.....	20	Stringtown.....	3	Maunie South.....	52
<i>Hamilton</i> : Belle Prairie.....	2	<i>Richland, Edwards</i> : Parkersburg.....	3	Maunie North.....	3
Bungay.....	1	<i>Satine</i> : Eldorado.....	24	New Harmony Consolidated.....	648
Dahlgren.....	42	<i>Shelby</i> : Lakewood.....	2	New Harmony South.....	4
Dale.....	125	Stewardson.....	3	New Haven.....	19
		<i>Wabash</i> : East Keensburg.....	3	Phillipstown.....	11
		Maud.....	295	Roland.....	91
		Mt. Carmel.....	18	Stokes.....	17
		Mt. Carmel (West).....	185	Storms.....	*153
			1	<i>White, Hamilton</i> : Mill Shoals.....	94
					10,592

\* 3 gas wells.

Table III: Bituminous Coal Production in the United States, by States, 1937-1941<sup>1</sup>  
(Thousands of net tons)

State	1937	1938	1939	1940	1941 <sup>2</sup>
Alabama.....	12,440	11,062	12,047	15,324	15,204
Alaska.....	132	155	148	174	241
Arkansas and Oklahoma.....	3,111	2,442	2,340	3,100	3,423
Colorado.....	7,187	5,663	5,923	6,589	6,905
Georgia and North Carolina.....	(3)	(3)	(3)	42	40
Illinois.....	51,602	41,912	46,783	50,610	54,200
Indiana.....	17,765	14,758	16,943	18,869	22,590
Iowa.....	3,637	3,103	2,948	3,231	2,950
Kansas and Missouri.....	6,984	6,090	5,948	6,676	7,445
Kentucky: Eastern.....	38,524	31,177	34,266	40,346	41,510
Western.....	8,563	7,368	8,291	8,795	11,765
Maryland.....	1,549	1,281	1,443	1,503	1,748
Michigan.....	562	495	457	410	370
Montana.....	2,965	2,732	2,804	2,867	3,200
New Mexico.....	1,715	1,239	1,230	1,111	1,250
North and South Dakota.....	2,298	2,098	2,120	2,284	2,426
Ohio.....	25,178	18,591	20,289	22,772	29,690
Pennsylvania (bituminous).....	111,002	77,705	92,584	116,603	127,470
Tennessee.....	5,213	4,472	5,185	6,008	6,713
Texas.....	910	879	826	621	368
Utah.....	3,810	2,947	3,285	3,576	4,013
Virginia.....	13,795	12,283	13,531	15,348	18,340
Washington.....	2,001	1,567	1,690	1,650	1,875
West Virginia.....	118,646	93,288	108,362	126,438	140,886
Wyoming.....	5,918	5,204	5,373	5,808	6,647
Other States <sup>4</sup> .....	24	34	39	17	21
Total bituminous.....	445,531	348,545	394,855	460,772	511,290

<sup>1</sup> U. S. Bituminous Coal Division, Weekly Coal Reports.

<sup>2</sup> Includes lignite.

<sup>3</sup> Included in "Other States".

<sup>4</sup> The states reporting are not identical from year to year.

Table IV: Trend of Mechanization in Illinois Coal Mines, 1928-1939<sup>1</sup> (in thousands of net tons)

Year	Strip mined	Per cent of total mined	Mined underground			Total	Grand total
			Hand loaded	Machine loaded	Per cent		
1928.....	4,339	7.8	44,638	6,971	13.5	51,609	55,948
1929.....	5,375	8.9	37,031	18,252	33.0	55,283	60,658
1930.....	6,116	11.4	24,768	22,847	48.0	47,615	53,731
1931.....	6,326	14.3	15,401	22,577	59.4	37,978	44,304
1932.....	6,551	19.6	11,564	15,360	57.0	26,923	33,475
1933.....	5,625	15.0	14,667	17,122	53.9	31,789	37,414
1934.....	6,160	14.9	16,630	18,482	52.6	35,112	41,272
1935.....	7,410	16.6	16,602	20,513	55.3	37,115	44,525
1936.....	9,113	17.9	15,704	26,110	62.4	41,814	50,927
1937.....	11,449	22.2	11,809	28,344	70.6	40,153	51,602
1938.....	10,570	25.2	7,978	23,363	74.5	31,342	41,911
1939.....	12,089	25.8	8,124	26,570	76.6	34,694	46,783
1940.....	12,025 <sup>2</sup>	23.8	9,065	29,520	76.8	38,585	50,610
1941.....	14,242 <sup>2</sup>	26.2	6,290	33,668 <sup>2</sup>	84.5	39,958	54,200

<sup>1</sup> U. S. Bituminous Coal Division Weekly Coal Report No. W.C.R. 1303, July 11, 1942, and Sixteenth Census of the U. S., 1940, Mineral Industries, 1939.

<sup>2</sup> Illinois Dept. Mines and Minerals, Sixtieth Coal Report, 1941.

### Illinois Also Rich in Industrial Minerals

The industrial minerals of Illinois include clay and clay products, cement, sand and gravel, crushed limestone, agricultural limestone, stone for flux and other uses, lime, fluorspar, fuller's earth, and sandstone. The production and value of these and other minerals for 1939 and 1940 is shown in Table V.

Table V: Summary of Production and Value of Illinois Minerals, 1939 and 1940

Mineral	1939 <sup>1</sup>		1940 <sup>3</sup>	
	Amount <sup>2</sup>	Value	Amount <sup>2</sup>	Value
Petroleum (barrels).....	94,302,000	\$101,200,000	146,788,000	\$158,746,200
Coal (tons).....	46,450,000	74,200,000	49,495,000	79,172,000
Pig iron (gross tons).....	2,860,577	57,718,814	3,900,000	78,650,000
Coke.....	1,884,240	11,963,932	3,014,840	18,217,939
Clay products, including pottery.....		12,600,456		15,453,783
Cement, portland (barrels).....	4,648,834	5,481,851	4,937,000	7,209,431
Sand and gravel (total tons).....	9,764,050	5,101,965	10,753,448	5,838,125
Sand:				
Structural.....	1,405,244	585,234	1,702,712	790,558
Paving and road making.....	879,337	383,288	1,363,919	521,022
Glass.....	(4)	(4)	(4)	(4)
Molding.....	486,490	467,955	553,472	530,402
Railroad ballast.....	(4)	(4)	(4)	(4)
Grinding and polishing.....	(4)	(4)	(4)	(4)
Blast.....	(4)	(4)	(4)	(4)
Filter.....	(4)	(4)	(4)	(4)
Fire and furnace.....	(4)	(4)	68,104	100,652
Engine.....	66,518	33,145	50,638	30,505
Other <sup>5</sup> .....	1,194,098 <sup>5</sup>	1,202,612 <sup>5</sup>	1,158,157	1,282,775
Gravel:				
Structural.....	1,489,468	726,724	1,553,123	825,323
Paving and road making.....	1,739,703	748,526	2,061,883	849,165
Railroad ballast.....	1,369,190	492,037	1,506,732	608,034
Other.....	1,134,002	462,264	734,708	299,689
Limestone (total tons).....	8,156,980	7,489,164	9,476,851	7,729,779
Construction.....	164,400	191,979	2,530	14,957
Curbing, flagging and paving.....	21,650	12,234	16,700	4,129
Road metal and concrete.....	5,965,470	5,409,074	5,660,360	4,229,303
Flux.....	319,790	311,580	567,350	572,515
Railroad ballast.....	239,220	161,044	359,540	234,056
Riprap.....	149,800	151,510	366,210	354,600
Rubble.....	2,080	2,884	20,930	33,105
Agricultural.....	1,444,273	1,272,336	2,258,751	1,910,000
Other uses.....	109,410	223,934	224,480	377,114
Natural gasoline (gallons).....	4,011,701	228,882	21,432,000	1,122,000
Lime.....	147,729	1,064,154	161,358	1,150,113
Fuller's earth.....	28,248	218,553	24,974	205,494
Fluorspar (short tons).....	75,257	1,638,693	104,698	2,313,747
Quartz (silica).....	(6)	(6)	(6)	(6)
Clay shipments.....	126,611	271,730	169,938	419,740
Tripoli.....	(6)	(6)	(6)	(6)
Sandstone.....	236,560	301,435	285,388	326,038
Pyrites.....	(6)	(6)	(6)	(6)
Other minerals <sup>7</sup> .....	1,077,211	1,253,534	2,020,624	2,813,491
Total value, including pig iron and coke manufacture.....		\$280,733,163		\$379,367,880
Total value, exclusive of pig iron and coke manufacture.....		\$211,050,417		\$282,499,941

<sup>1</sup> Final figures.<sup>3</sup> Preliminary figures.<sup>5</sup> Includes figures for glass, grinding and polishing, blast, filter, and railroad ballast sand in 1940; in 1939, figures include fire and furnace sand in addition.<sup>6</sup> Included in "Other minerals."<sup>7</sup> Includes figures for quartz, feldspar pyrites, amorphous silica (tripoli), crushed miscellaneous stone, and natural cement.

Fluorspar is deserving of special mention because it is a critical war mineral. The Illinois-Kentucky fluorspar field is now the major source from which the Western Hemisphere must obtain its fluorspar for use in the all-important manufacture of steel and of aluminum. Production, exploration, and further development are proceeding rapidly in Hardin and Pope counties, Illinois. The Geological Survey is actively lending its aid, both in the field and laboratory, to the State's fluorspar industry, and is further cooperating fully with various Federal agencies interested in increased production and maintenance of reserves in the Illinois field.



*The world's largest bituminous coal mine is located near West Frankfort, Ill.*

Agricultural limestone production rose above the two million ton mark in 1940, which again gives Illinois the distinction of being the largest producer in the country. The use of limestone on farms has been substantially stimulated through the agricultural conservation program. Mineral renewal of the soil at a time of great food production is most fortunate.

#### *New Geological Survey Laboratories*

At a very propitious time the Geological Survey has come into the possession of facilities for research which are most valuable in furnishing needed new information for this new technological war period. The new Natural Resources Building, built to house the Geological Survey and the Natural History Survey, was completed and occupied. The facilities for research which it provides will enable the Geological Survey, in its mineral research, to employ the most modern techniques of geological, physical and chemical science including the X-ray and spectograph.

The building has five floors, all of which are fully utilized as offices, laboratories, grinding rooms, preparation rooms, machine shops, geologic collections, drafting rooms, filing rooms, photography, and library. All laboratories are directly serviced with distilled water, steam, vacuum, and compressed air, electric current of various voltages, and much special equipment. Each laboratory is tailor-made for the particular kind of research to which it is devoted. Machine shops have been equipped for the construction of specialized research apparatus not available in the open market.

Six laboratories are especially devoted to research on coal, two for investigations directed to an understanding of the occurrence of oil and gas and groundwater, eight to studies of the non-metallic industrial minerals, two for investigations of paleontology and stratigraphy, and seven for research phases which are common to various minerals.

In addition, another building, known as the Geological Survey Laboratory, was completed for large-scale experimental work. It is located near the University Power Plant and in it applied research work on semi-plant scale is carried on to test the commercial merits of successful small-scale laboratory findings.

#### *Special Program Is Outgrowth of Defense Needs*

With the declaration of war, certain critical needs related to the State's mineral resources in the prosecution of war became immediately evident. With admirable alertness, the Governor called a special session of the Legislature, and one of the fruits of this meeting was a special appropriation for the Geological Survey for immediate expansion of its studies of the geological aspects of groundwater supplies, the search for additional oil and gas resources, the protection of our coal mines from damage by improper plugging of oil wells, and the prompt collection and distribution of all sorts of critical information.



*Hydraulic mining of silica sand in LaSalle County*

The structure of the Geological Survey's organization and the very nature of its normal program of research has enabled it to swing into this accelerated defense effort with a minimum of readjustment.

#### *Has Gathered Mass of Information on Resources*

For 36 years the Geological Survey has been mapping and assembling information on the geology and mineral resources of the State. Parts of the State have been covered in great detail, other areas in general reconnaissance, but with the extensive files of records of water wells, oil and gas wells, test holes, mine shafts, quarries, pits and cliff sections, a wealth of data has been accumulated.

This information is being constantly drawn upon by all of the mineral industries of the State—coal mining companies, oil and gas companies, clay and clay products plants, rock and rock products plants, fluorspar mining interests, and others, by government institutions, municipalities and industrial plants in obtaining groundwater supplies; by county agricultural agents who promote the use of agricultural limestone for developing and conserving the productivity of the soils of the State; by engineers who require information on foundation conditions for large buildings, bridges, viaducts, pavements and dams for water reservoirs; by railroad companies who promote industrial development along their lines; and by universities, colleges and public schools for courses in science, sociology and economics.

The preparation of an accurate topographic map of the State has also been in progress, and now that more than 70 per cent of the State has been mapped, there are many calls for maps, elevation data, locations of established benchmarks, accurate distances, drainage conditions, topographic situations, etc., to meet the demands of the industrial development which is in progress or contemplated.

#### *Supply Information For Manufacturers*

Those engaged in chemical, metallurgical, and general manufacturing—wherever mineral raw materials are used in processing, for heat and power, or as a part of the manufactured product—have increasing need of information on sources and properties of a great variety of mineral substances. The changing technology, the appearance of new products, the demand for more rigid specifications of materials, new transportation facilities, changes in trade relations, and other factors require detailed physical and chemical information on materials not hitherto developed and information on methods of preparing such raw materials for specific uses.

The rank of Illinois as the third State in the Union in the value of manufactured products is significant of the need and use made of such information. The Survey's studies in mineral economics have also developed valuable information for the industries of the State in their effort to enlarge their markets and successfully meet competitive conditions.

#### *Survey's Research Program Is Varied*

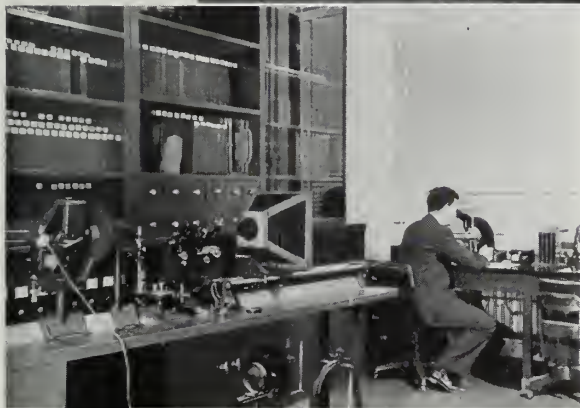
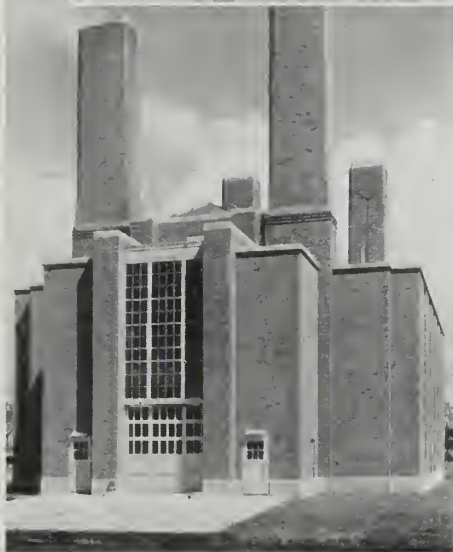
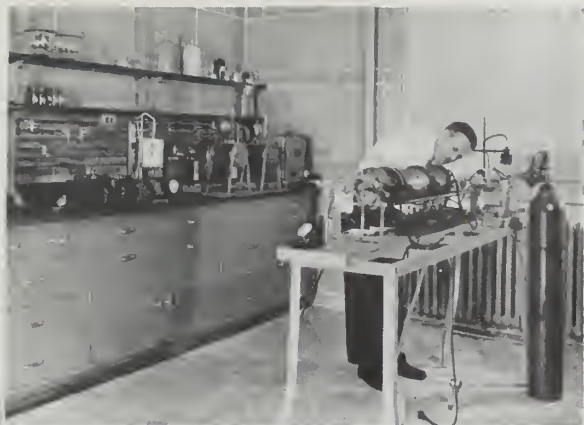
The research program of the Survey has been necessarily varied to meet the needs, embracing the fuel minerals of coal and oil, clay and clay products, rock and rock products of many kinds, fluorspar, groundwater, engineering foundation conditions, fundamental stratigraphy and paleontology, and clay mineralogy.

A study was completed and published on the geology, structure, and oil possibilities of extreme southern Illinois covering Union, Johnson, Pope, Hardin, Alexander, Pulaski, and Massac counties. Information is also being compiled on the methods being used and results attained by secondary recovery methods in various parts of the new oil fields. Collections are made of well-cutting samples, cores, and well logs, and samples of oil, gas, and brine are analyzed.

Oil development maps have been issued for nine new areas and four additional new maps are nearing completion. Revisions have been made on 14 earlier maps. A monthly report is issued regularly giving detailed developments in the oil fields.



*Coal research laboratory in Natural Resources Building, right, and center, the Geological Survey Research Laboratory, designed for investigations requiring large-scale equipment*



*Left, special microscopes and optical equipment are used continually in Illinois mineral research*



*Airplane view of a large brick plant in northern Illinois.  
(Fairchild Aerial Surveys, Inc.)*

The potential possibilities of clay and shale resources of the State are great and much attention is being devoted to them. Two fundamental lines of investigation have been followed in the search for new information: (1) field studies of all of the varieties of clays and shales in the State having potential promise of development, and (2) a study of their constitution and properties to determine new and improved uses for both ceramic and non-ceramic purposes. A new directory of clay and clay products producers has lately been published which gives information on the locations of plants and their products.

High purity dolomite resources are also being sought for use in the steel industry and for possible use in the manufacture of magnesium metal. The latter use was formerly considered remote but recently developed processes make the production of magnesium from dolomite a reality. Inquiries regarding possible sources of available dolomite of suitable composition indicate industrial interest.

A report has lately been published on "Feldspar in Illinois Sands." Feldspar producers and glass manufacturers are interested in local sources of this mineral on account of the increased use of glass to replace tin containers.

Another investigation under way concerns the possible use of some of the highly colored clays and shales of Illinois as pigments for camouflage paints for war purposes.

Cooperative studies are in progress to increase the amounts of rouge grade tripoli commercially recoverable from the amorphous silica deposits of southern Illinois. This tripoli is used for polishing optical lenses for important war purposes, and domestic supplies are of paramount importance due to the cutting off of foreign sources.

One large outlet for Illinois clays, of particular importance in the present effort to produce the maximum amount of armament, is in the foundry industry, in the bonding of molding sands required to produce all kinds of cast metal shapes. An intensive study is being made of the Illinois clays for this purpose.

Other studies in clay-mineral technology, created by the war effort, include research on the extraction of aluminum, and new treatment processes for producing large clay-mineral sheets with the proper electric insulating qualities so that they may take the place of imported mica in electrical apparatus.



*Huge mechanical shovels have made large-scale coal stripping operations possible*

### *Geology of Groundwater Is Important*

Because of the great importance of water in the defense program, as well as in normal life and industrial activity, the study of the geologic aspects of groundwater supplies has become an increasingly large fraction of the research work of the Geological Survey. During the past year, 70 local studies have been made for municipalities and subdivisions, 40 for parks, schools and public works, 52 for industries, and 166 for private supply. This information is the result of geological studies in the field and in the laboratory on well-cutting samples and well logs. The Survey also employs an electrical earth-resistivity apparatus in certain areas where grave problems of finding water have been encountered. Extensive surveys have been made especially in the Peoria region.

The critical need for additional information, especially in areas of contemplated defense construction, resulted in a special appropriation by the Legislature for rapid furtherance of this work. In all of this, close co-operation is given the State Water Survey and the State Department of Public Health.

### *22 Maps of Chicago Area Completed*

The final preparation of 22 geologic maps of the Chicago area has been completed and printing has been undertaken. An extensive report on the geology of the Marselles-Ottawa-Streator area is nearly completed. Other stratigraphic and paleontologic studies to furnish fundamental information have also been made. A revised map of the geology of Illinois and a new glacial map of Illinois are being prepared.

Many reports have been made on the geologic conditions at proposed damsites for municipal water reservoirs, and much assistance has been

rendered the State Highway Division in connection with geologic problems of road building.

Six field conferences, held for science teachers in various parts of the State, had an average attendance of about 65 teachers. To meet the continuing demand for class material, the Survey prepared many school sets of rocks, minerals and fossils characteristic of the State. A pamphlet was also prepared on "The New Oil Fields of Southern Illinois" in co-operation with the Illinois Chamber of Commerce, which was especially valuable to the public schools.

Preparation of a state topographic map, which requires many years to complete, was further advanced by 575 square miles of additional completed mapping, in co-operation with the U. S. Geological Survey. A complete list of the maps now available together with a list of all geological publications may be secured by addressing the Chief, 100 Natural Resources Building, Urbana.

#### Publications Issued in 1940 and 1941

##### Oil and Gas

###### MAPS

Oil and Gas Map of Illinois: A. H. Bell and G. V. Cohee. Editions of 1939, 1940 and 1941.

###### REPORTS OF INVESTIGATIONS

67—Porosity, Total Liquid Saturation, and Permeability of Illinois Oil Sands: R. J. Piersol, L. E. Workman, and M. C. Watson. 1940.

71—Geology and Oil Possibilities of Extreme Southern Illinois—Union, Johnson, Pope, Hardin, Alexander, Pulaski, and Massac counties: J. M. Weller. 1940.

76—Surface Structure Map of Shelby, Effingham, and Fayette counties: W. A. Newton. Explanation and Summary: J. M. Weller and A. H. Bell. 1941.

###### CIRCULARS

59—Structural Trends in the Illinois Basin: G. V. Cohee and C. W. Carter. 1940.

67—Recent Developments in Oil and Gas in Illinois: G. V. Cohee. 1940.

75—Role of Fundamental Geologic Principles in the Opening of the Illinois Basin: A. H. Bell. Dec., 1941.

###### ILLINOIS PETROLEUM SERIES

35—Oil and Gas Development in Illinois in 1939: A. H. Bell and G. V. Cohee. 1940.

36—Developments in Eastern Interior Basin, 1939 and First Quarter of 1940: A. H. Bell. 1940.

37—Oil and Gas Development in 1940: A. H. Bell and G. V. Cohee. 1941.

38—Development in Eastern Interior Basin in 1940: A. H. Bell. 1941.

39—"Trenton" Production in Illinois: G. V. Cohee. 1941.

###### OIL AND GAS DRILLING REPORTS

39-62 inc. Monthly reports on drilling activity. Mimeographed.

##### Coal

###### REPORTS OF INVESTIGATIONS

63—Illinois Mineral Industry in 1939, with Special Discussion of the Distribution of Coal in 1937: W. H. Voskuil and G. N. Oliver.

73—Moisture Relations of Banded Ingredients in an Illinois Coal: O. W. Rees, G. W. Land, and F. H. Reed. 1941.

###### CIRCULARS

58—Structure of Herrin (No. 6) Coal Bed in Randolph, Western Perry, Southwestern Washington, and Southeastern St. Clair counties: G. H. Cady. Notes on the Oil and Gas Possibilities: A. H. Bell. 1940.

70—The Oxidizing Power of Illinois Coal. I. The Reaction with Titanous Chloride: G. R. Yohé and C. A. Harman. 1941.

71—Structure of Herrin (No. 6) Coal Bed in Madison County and Western Bond, Western Clinton, Southern Macoupin, Southwestern Montgomery, Northern St. Clair, and Northwestern Washington counties: J. N. Payne. Notes on Oil and Gas Possibilities: A. H. Bell. 1941.

73—Contribution to Pennsylvanian Paleobotany: Notes on the Lepidocarpaceae. J. M. Schopf. 1941.

##### Industrial Minerals

###### REPORTS OF INVESTIGATIONS

44—The Mica in Argillaceous Sediments: R. E. Grim, R. H. Bray, and W. F. Bradley. Second printing. 1941.

63—Illinois Mineral Industry in 1939, With Special Discussion of the Distribution of Coal in 1937: W. H. Voskuil and G. N. Oliver. 1940.

- 64—Tests on Face Brick from Illinois and Other States: C. W. Parmelee. 1940.
- 65—Agricultural Limestone Resources of Cumberland, Effingham, Clay, Richland, and Jasper counties: R. M. Grogan and J. E. Lamar. 1940.
- 66—Investigations of the Effect of Heat on the Clay Minerals Illite and Montmorillonite: R. E. Grim and W. F. Bradley. 1940.
- 68—Effect of Fluorspar on Silicate Melts with Special Reference to Mineral Wool: J. S. Machin and J. F. Vanecek. 1940.
- 69—(1) Elements of the Petrographic Study of Bonding Clays and of the Clay Substance of Molding Sands: Ralph E. Grim.  
 (2) Mineral Composition and Texture of the Clay Substance of Natural Molding Sands: Ralph E. Grim and Carl E. Schubert.  
 (3) Relationship between the Physical and Mineralogical Characteristics of Bonding Clays: Ralph E. Grim and Richards A. Rowland. 1940.
- 72—Petrographic and Ceramic Properties of Pennsylvanian Shales of Illinois: R. E. Grim. 1941.
- 74—Part 1—Illinois Mineral Industry in 1940; Part 2—Historical Summary, 1919-1939: W. H. Voskuil and G. N. Oliver. 1941.

#### CIRCULARS

- 61—Agricultural Limestone Distribution in Illinois in 1939: W. H. Voskuil and G. N. Oliver. 1940.
- 62—Progress Report on the Investigation of the Properties of Illinois Shales and Clays as Mortar Mix: R. K. Hursh, J. E. Lamar, and R. E. Grim. 1940.
- 65—(1) The Profile of Soil Weathering and Its Importance in Highway Construction: G. E. Ekblaw.  
 (2) The Clay Minerals in Soils and Their Significance: R. E. Grim. 1940.
- 72—Agricultural Limestone Distribution in Illinois in 1940. Preliminary report: W. H. Voskuil and G. N. Oliver. 1941.

#### General Geology

#### BULLETINS

- 65—Geology of the Chicago Region—Part 1, General: J. H. Bretz. 1940.

#### REPORTS OF INVESTIGATIONS

- 61—Subsurface Geology of the Chester Series in Illinois: L. E. Workman. Subsurface Geology of the Iowa (Lower Mississippian) Series in Illinois: J. N. Payne. 1940.
- 62—Mississippian Border of the Eastern Interior Basin: J. M. Weller. 1940.
- 70—Preliminary Geologic Map of Parts of the Alto Pass, Jonesboro, and Thebes Quadrangles—Union, Alexander, and Jackson counties: J. M. Weller and G. E. Ekblaw. Explanation and Stratigraphic Summary: J. M. Weller. Includes map on scale of 1 inch to the mile. 1940.
- 76—Surface Structure Map of Shelby, Effingham, and Fayette counties: W. A. Newton. Explanation and Summary: J. M. Weller and A. H. Bell. 1941.
- 77—Chester Ostracodes of Illinois: C. L. Cooper. 1941.

*Filling a brick kiln at a northern Illinois plant*

