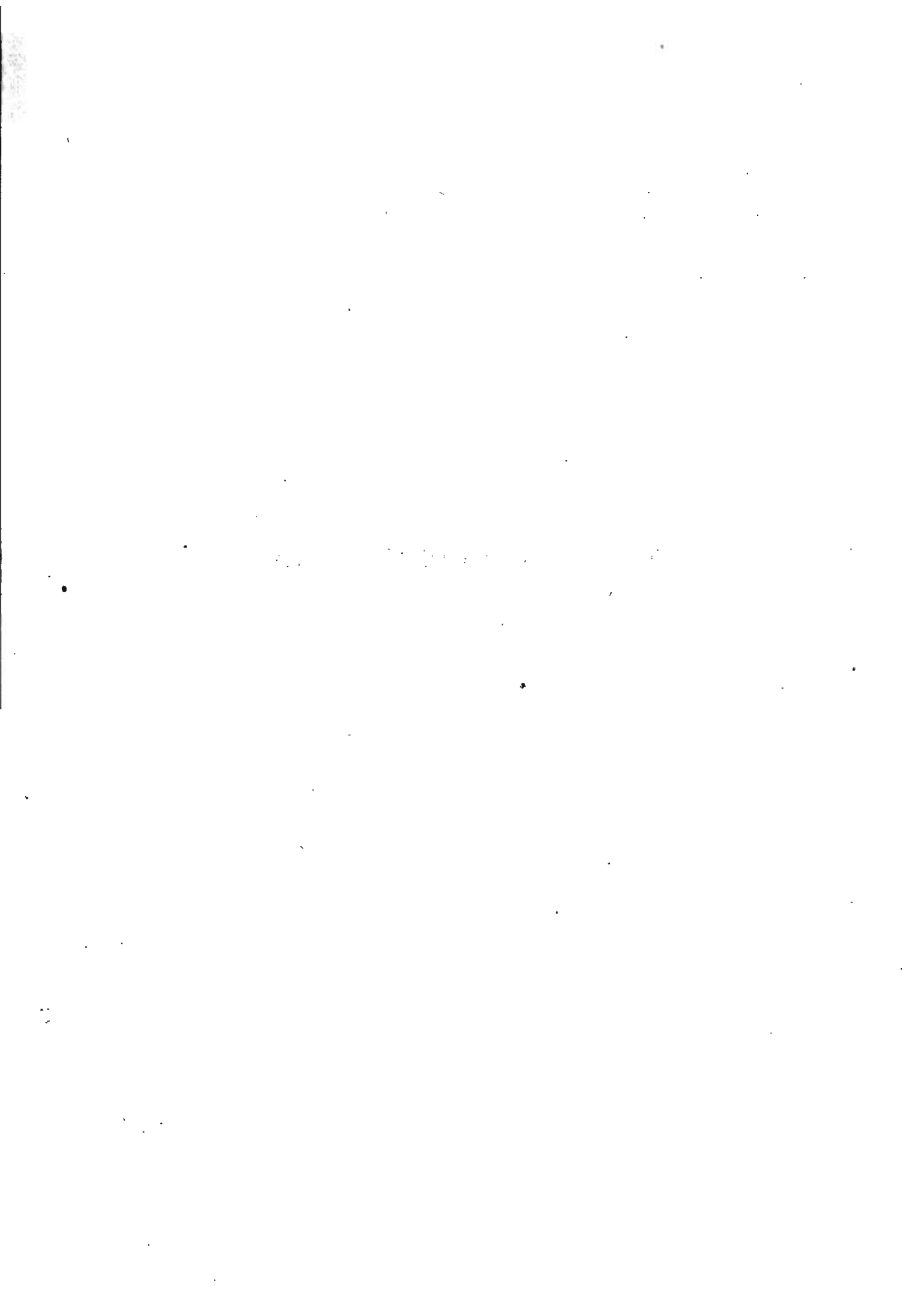

**MINERAL PRODUCTION IN IOWA
IN 1919 AND 1920**

**BY
JAMES H. LEES**



MINERAL PRODUCTION IN IOWA IN 1919 AND 1920¹

Product	Unit 1918	Quantity	Value
Cement	Barrels	3,188,669	\$ 5,423,926
Clay products			5,315,143
Clay, raw	short tons	5,416	3,705 (a)
Coal	short tons	8,192,195	24,703,237
Gypsum	short tons	327,927	1,946,414
Mineral waters	gallons sold	87,703	3,937
Natural Gas	M cubic feet	1,758	245
Sand and gravel	short tons	2,004,444	904,307
Stone and lime			444,800
Miscellaneous (c)			1,120,418
Total value 1919			\$38,742,009
Cement	Barrels	4,569,110	\$ 7,798,347
Clay products			8,125,324 (a)
Coal	short tons	5,624,692	17,352,620
Gypsum	short tons	421,279	2,634,444
Mineral waters	gallons sold	39,661	5,703
Natural gas	M cubic feet	740	200
Potash	short tons	89	20,025
Sand and gravel	short tons	2,093,471	1,383,764
Stone and lime	short tons	519,030	567,356
Miscellaneous (b)			474,900
Total value, eliminating duplicates 1920			\$37,882,183
Cement	Barrels	4,421,783	\$ 8,742,854
Clay products			10,489,232 (a)
Coal	short tons	7,774,916	30,605,847
Gypsum	short tons	571,895	4,422,965
Mineral waters	gallons sold	38,877	3,419
Natural gas	M cubic feet	827	290
Sand and gravel	short tons	2,467,644	1,993,441
Stone and lime	short tons	620,565	840,544
Total value, eliminating duplicates			\$57,062,317

(a) Includes pottery and raw clay sold. Value of raw clay not included in total value for state.

(b) Not included in total value for state. Includes ferro-alloys and raw clay sold.

(c) Not included in total value for state.

The value of the minerals produced in Iowa in 1919 was \$37,882,183, a decrease of \$859,826 from the production of 1918. This decrease simply reflects the reaction from wartime production which had begun in 1918, and also the unsettled condition of industry in general. Specifically the decrease is due

¹As in previous years the mineral statistics have been compiled by the Iowa Geological Survey and the United States Geological Survey in cooperation.

largely to the smaller output of coal, as the value of the other major materials produced was somewhat larger in 1919. On the other hand the value of the output for 1920, \$57,062,317, was nearly twenty million dollars more than that of the preceding year. An inspection of the tables given above shows that this large increase was caused chiefly by the great rise in the value of the coal produced, as well as in its larger amount, and also by the increased output and larger values of the other minerals. This again reflects the change which had come over business, for although there was still much unrest, prices were showing an upward trend.

Coal still held the chief place among Iowa mineral products and its comparative value rose from twice that of its nearest competitor, clay products, in 1919 to nearly three times in 1920. Clay products, cement, gypsum and sand and gravel held the rank here indicated during both years and with coal made up much the greater part of the production.

It has been impossible to secure detailed statistics for the output of some of the minerals during 1919, hence itemized tables giving the production during this year can not be presented. Table I shows the production in the various counties during 1920, so far as these may be revealed. It shows that eighty counties shared in the mineral production of the state, and that of these twenty produced coal, fifty produced clay wares, forty-two produced sand and gravel and eighteen produced stone and lime. In addition twelve counties produced miscellaneous materials including cement, which came from three counties, gypsum, which came from two, mineral waters, which came from five, and natural gas, which came from two counties.

TABLE I.
TABLE OF MINERAL PRODUCTION IN IOWA IN 1920.

County	No. of Producers	Coal	Clay and Clay Products	Stone and Lime	Sand and Gravel	Other Products*	Total Value
Adair	1				*		*
Adams	4	\$ 38,734					\$ 38,734
Allamakee	3		*	*			108,557
Appanoose	64	6,798,711	*			*	6,899,267
Audubon	1		*				*
Benton	4		\$ 79,846				79,846
Black Hawk	6			*	\$ 66,484		*
Boone	6	1,276,005	*				1,551,328
Bremer	2				*		*
Buena Vista	3		*		*		*
Butler	2				*		*
Cass	1		*				*
Cedar	1		*				*
Cerro Gordo	12		2,818,423	*		*	9,353,883
Cherokee	3				92,058		92,058
Clay	1				*		*
Clayton	2			*	*		*
Clinton	6		*	*	19,300		*
Dallas	9	1,676,646	1,082,955				2,759,601
Des Moines	4		*	*	*		68,349
Dickinson	1					*	*
Dubuque	11		*	94,521	*	*	146,660
Emmet	3				*	*	8,156
Fayette	4				41,275		41,275
Floyd	1		*				*
Franklin	5		*		3,165		*
Greene	2	*					*
Guthrie	3	*				*	1,310
Hancock	1		*				*
Hardin	3		*	*	*		157,950
Harrison	1				*		*
Henry	3		*	*			*
Howard	2		*	*			*
Humboldt	1				*		*
Ida	1				*		*
Iowa	2		*				*
Jackson	6		*	*	16,035		124,443
Jasper	5	*	*			*	84,353
Jefferson	3	*	*				*
Johnson	5		*		18,210		*
Jones	6		*	87,819	*		112,268
Keokuk	6	*	452,541				*
Kossuth	1		*				*
Lee	4		*	63,595			*
Linn	6		*	*	63,199		*
Louisa	3		*			*	3,240
Lucas	3	1,232,883					1,232,883
Lyon	2				*		*
Madison	2		*	*			*
Mahaska	14	220,157			*		*
Marion	17	2,789,771	284,527		*		*

TABLE OF MINERAL PRODUCTION IN IOWA IN 1920.

County	No. of Producers	Coal	Clay and Clay Products	Stone and Lime	Sand and Gravel	Other Products*	Total Value
Marshall	1				*		*
Mills	1		*				*
Mitchell	1			*			*
Monroe	11	9,769,187					9,769,187
Muscatine	6		*		128,908		*
O'Brien	4		*		7,867		7,867
Osceola	3				6,707		6,707
Page	3	*	*				*
Palo Alto	1				*		*
Plymouth	3				18,419		18,419
Pocahontas	1			*		*	*
Folk	38	4,689,550	1,200,330		469,155	*	*
Poweshiek	4		53,548				53,548
Sac	3		*		*		*
Scott	8		*	291,850	*		411,879
Sioux	5				77,940		77,940
Story	2		*				*
Tama	4		81,257				81,257
Taylor	1	*					*
Union	1		*				*
Van Buren	4	37,236					37,236
Wapello	23	563,574	202,133		79,584		845,291
Warren	2	*	*				*
Washington	4		111,190				111,190
Wayne	2	*					*
Webster	17		1,144,062		40,999	*	*
Winneshiek	3		*		*		*
Woodbury	5		531,383		*	*	*
Wright	3		*		*		*
Counties with less than three producers in any one industry		1,701,393	2,397,762	537,785	884,136	13,169,528	18,690,604
Totals	426	\$30,793,847	\$10,489,232	\$840,544	\$1,993,441	\$13,169,528	\$57,062,317

*Included in counties with less than three producers.

*Includes: Cement, \$8,742,854; gypsum, \$4,422,965; mineral waters, \$3,419; natural gas, \$290.

COAL MINING.

As was stated above detailed statistics for 1919 are not available, but the summary reports show the following facts:

	Tons	Value
Loaded at mines for shipment	4,849,636	\$14,672,888
Sold to local trade or used by employees.....	610,937	2,294,561
Used at mine for power and heat.....	164,119	385,171
	<hr/>	<hr/>
Total production in 1919.....	5,624,692	\$17,352,620
Average number of days mines were operated.....	176	
Average number of men employed—		
Underground	10,873	
Surface	1,493	
	<hr/>	
	12,366	

These figures, when compared with those for 1918, which show a tonnage of 8,192,195 valued at \$24,703,237, show markedly the effect of slack demand in the first part of the year and the strike during November. On the other hand, the figures for 1920 show a large increase in the output and a sharp rise in prices.

Table II shows the figures for this year.

TABLE II.

COAL PRODUCTION IN 1920 BY COUNTIES.

County	No. Producers	Loaded at Mines for Shipment		Sold to Local Trade and used by Employees		Used at Mines for Steam and Heat		Total Quantity		Number of Employees			Av. No. of days worked
		Short Tons	Value	Short Tons	Value	Short Tons	Value	Short tons	Value	Under-ground	Surface	Total	
Adams	4			8,419	\$ 38,734			8,419	\$ 38,734	34	6	40	168
Appanoose	62	1,411,232	\$ 6,385,927	75,921	340,910	24,446	\$ 71,874	1,511,599	6,798,711	2,840	330	3,170	242
Boone	3	254,913	935,329	60,404	322,594	7,200	18,082	322,517	1,276,005	540	51	591	239
Dallas	4	428,629	1,610,909	9,864	47,506	6,177	18,231	444,670	1,676,646	589	60	649	272
Greene and Guthrie	3			8,022	40,100			8,022	40,100	19	3	22	190
Jasper, Jefferson, Keokuk	5	180,961	727,466	31,600	151,545	10,025	31,784	231,586	910,795	316	47	363	216
Lucas	3	370,150	1,149,222	12,592	37,840	14,940	45,821	397,682	1,232,883	581	48	629	237
Mahaska	13	Included in "Sold to Local Trade"		64,430	220,157	Incl. in "Sold to Local Trade"		64,430	220,157	80	16	96	223
Marion	12	756,483	2,617,307	30,630	112,676	18,610	59,788	805,723	2,789,771	903	92	995	267
Monroe	11	2,409,358	9,468,153	39,568	157,387	54,350	143,647	2,503,276	9,769,187	2,806	258	3,064	259
Page and Taylor	3	4,745	24,000	18,161	91,100			22,906	115,100	53	5	58	251
Polk	17	864,452	3,306,742	292,538	1,305,624	26,832	77,184	1,183,822	4,689,550	1,568	157	1,725	255
Van Buren	4	Included in "Sold to Local Trade"		7,538	37,236			8,845	37,236	14	5	19	274
Wapello	16	Included in "Sold to Local Trade"		141,823	558,205	1,970	5,369	143,793	563,574	221	38	259	221
Warren and Wayne	4	93,163	345,864	16,531	74,302	7,932	27,234	117,626	447,398	193	32	225	244
Small Mines		30,000	150,000	9,000	38,000			39,000	188,000				
		6,929,214	\$27,128,512	711,187	\$3,162,757	173,515	\$502,578	7,813,916	\$30,793,847	10,757	1,148	11,905	250

MINERAL PRODUCTION IN 1919 AND 1920

The tables show an increase in the average value at the mine from \$3.08 per ton in 1919 to \$3.94 per ton in 1920, an increase which may be attributed in part to improving business conditions and in part to increased competitive buying, as the stocks had been much reduced during the later part of 1919.

The leading coal producing states of the Union were ranked in 1919 as follows:

	Tons	Value
Pennsylvania (bituminous)	150,758,154	\$ 365,430,504
West Virginia	79,036,553	196,551,015
Illinois	60,862,608	140,075,969
Ohio	35,876,682	79,496,301
Kentucky	30,036,061	73,891,049
Indiana	20,912,288	46,345,750
Alabama	15,536,721	45,937,681
Colorado	10,323,420	28,745,534
Virginia	9,326,830	23,774,941
Wyoming	7,219,738	18,751,024
Iowa	5,624,692	17,352,620
Kansas	5,224,724	15,917,053
Total bituminous	465,860,058	1,160,616,013
Pennsylvania anthracite	88,092,201	364,926,950
Total for U. S.	553,952,259	\$1,525,542,963

A comparison of these figures with those for 1910 shows that in the earlier year Iowa produced 7,928,120 tons, valued at \$13,903,913, an average price of \$1.75 per ton. In that year Iowa ranked ninth in tonnage and value of output. In 1919 the tonnage was 2,303,428 less than a decade previous, but the value had increased \$3,448,707, a rise in average value of \$1.33 per ton. During the later year Iowa ranked eleventh in tonnage and value, having been passed by Virginia and Wyoming.

A list of the chief producers of coal in 1918, the last year for which statistics are available, includes the following. Figures are short tons and are tentative.

United States	678,211,904
Great Britain	255,040,328
Germany	273,930,000
France	30,864,000
Belgium	15,229,000
Japan	30,600,000
Canada	14,979,213
New South Wales	10,160,000
Union of South Africa	11,937,682
Holland	5,277,813

Queensland	1,101,176
Dutch East Indies	1,000,000
Approximate total for the world	1,468,000,000
Per cent produced by United States	46.2

CLAY PRODUCTS.

Clay products increased largely in value in 1919 over the output for 1918, the increase being from \$5,318,848 to \$8,125,324. This increase was accounted for by the removal of war restrictions and the partial return to normal industrial and business conditions. In 1920 the value of the product rose still higher—to \$10,489,232.

The following summary will give an idea of the progress of the industry.

	1918		1919	
	Quantity	Value	Quantity	Value
Common brick	67,292 M	\$ 749,325	66,632 M	\$ 941,489
Vitrified brick	6,793 M	116,522	8,673 M	179,969
Face brick	11,383 M	188,041	20,603 M	449,491
Drain tile		2,256,200	341,587 tons	3,127,378
Sewer pipe		398,848	43,698 tons	902,008
Fireproofing	238,789 tons	1,550,076	249,335 tons	2,475,291
Other products		32,206		31,975
Pottery and clay		5,454		17,723
		\$5,318,848		\$8,125,324
	1920			
	Quantity		Value	
Common brick	60,270 M		\$ 1,146,182	
Vitrified brick	6,116 M		176,430	
Face brick	13,678 M		346,164	
Drain tile	453,122 tons		4,760,115	
Sewer pipe	41,634 tons		918,669	
Fireproofing	293,081 tons		3,048,776	
Other products			43,621	
Pottery and clay			49,275	
			\$10,489,232	

These summaries reveal the upward trend in prices during the three years represented and this trend may be shown also by the following table of average prices received.

	1918		1919		1920	
	Iowa	United States	Iowa	United States	Iowa	United States
Common brick	\$11.14	\$10.90	\$14.12	\$13.38	\$18.95	\$16.95
Vitrified brick	17.15	17.74	20.75	23.74	28.85	27.06
Face brick	16.52	17.10	21.82	20.27	25.31	24.71
Drain tile			9.32	8.82	10.51	10.51
Sewer pipe			20.64	14.50	22.07	21.34
Fireproofing	6.49	6.67	8.40	7.71	10.40	10.62

Iowa's rank among the states of the Union is shown by the following table:

TEN LEADING STATES IN VALUE OF CLAY PRODUCTS.

State	1919				1920				
	Rank	No. of firms reporting	Value, not including raw clay sold	Percentage of total	Rank	No. of firms reporting	Value, not including raw clay sold	Percentage of total	Increase in 1920; per cent.
Ohio	1	416	\$ 63,787,319	23.2	1	386	\$ 82,061,960	21.9	28.6
Pennsylvania	2	336	39,270,613	14.3	2	307	50,983,988	13.6	29.8
New Jersey	3	126	26,545,959	9.6	3	137	40,021,028	10.7	50.8
Illinois	4	142	17,408,022	6.3	4	156	26,138,419	7.0	50.2
New York	5	120	14,468,586	5.2	5	142	19,113,684	5.1	32.1
West Virginia	6	59	13,097,598	4.8	7	55	17,167,843	4.6	31.1
Indiana	7	163	11,634,097	4.2	8	149	15,494,795	4.1	33.2
Missouri	8	65	10,997,949	4.0	6	73	17,474,542	4.7	58.9
Iowa	9	115	8,125,324a	2.9	10	109	10,489,232a	2.8	28.8
California	10	66	5,834,648	2.1	9	65	10,946,423	2.9	87.6
Total U. S.		2,776	\$275,346,378			2,716	\$373,670,102		35.7

a Includes raw clay sold.

In brick and tile products Iowa ranked eighth in both 1919 and 1920. In common brick she ranked twenty-first in 1919 and twentieth in 1920. In hollow building tile she ranked second in 1919, being exceeded by Ohio alone, and third in 1920, as New Jersey passed her by about half a million dollars. In drain tile Iowa was, as usual, the leader, her nearest competitor, Ohio, being well over a million dollars behind in 1919, and over three million in 1920. In sewer pipe Iowa ranked sixth in 1919, but dropped to eighth in 1920, as her production remained almost stationary while that of the other leading states increased largely.

Table III shows the output of clay wares by the different counties in the two years here considered.

TABLE III

VALUE OF CLAY PRODUCTS IN 1919.

County	No. of Producers	Common Brick	Drain Tile	Hollow Building Tile	Other Products ^c	Total Value
Allamakee	1	*	*	*		*
Appanoose	1	*				*
Audubon	2	*	*	*		*
Benton	3	*a	20,822	12,002		32,824
Boone	2	*	*	*	*	*
Buena Vista	2		*			*
Cass	1	*	*	*		*
Cedar	1	*a	*	*		*
Cerro Gordo	6	*a	934,640	590,165		1,524,775
Clinton	1	*	*			*
Dallas	5		201,692	414,310		616,002
Des Moines	1	*	*	*		*
Dubuque	2	*				*
Fayette	1	*		*	*	*
Floyd	1	*	*	*		*
Franklin	2	*	*	*		*
Grundy	1	*			*	*
Guthrie	1		*	*		*
Hamilton	1		*		*	*
Hancock	1		*			*
Hardin	1		*			*
Henry	2	*	*	*		*
Howard	1	*	*	*		*
Humboldt	1		*			*
Iowa	2	*	*	*		*
Jackson	1			*		*
Jasper	2	*	*	*		*
Jefferson	3	*	30,673	*		38,778
Johnson	1	*	*			*
Jones	2	*	*	*		*
Keokuk	5	*	215,822	*	*	328,970
Kossuth	1		*			*
Lee	1	*				*
Linn	1		*			*
Louisa	1		*	*		*
Madison	1		*	*		*
Mahaska	1	*	*	*	*	*
Marion	4	4,326	54,707	134,816		193,849
Marshall	1	*	*	*		*
Mills	1	*				*
Muscatine	2	*				*
Page	1	*	*	*		*
Polk	8	*a	274,042 ^b	265,503	462,848	1,002,393
Pottawattamie	1	*				*
Poweshiek	4	*a	27,403	8,389		35,792
Sac	1	*	*	*		*
Scott	2	*	*	*	*	*
Story	2	*	*	*		*
Tama	4	*	23,261	*	*	61,790
Union	1	*	*	*		*
Wapello	2	*	*	*	*	*

TABLE III Continued

County	No. of Producers	Common Brick	Drain Tile	Hollow Building Tile	Other Products ^a	Total Value
Warren	1		*	*		*
Washington	4	6,095	53,547	29,139		88,781
Webster	9	* ^a	552,421	651,552	620,460	1,823,433
Winneshiek	1	*				*
Woodbury	2	*		*	*	*
Wright	1			*	*	*
Counties with less than three producers		931,068	738,348	445,671	480,135	2,360,214
	115	941,489	3,127,378	2,475,291	1,563,443	8,107,601
Pottery and clay sold						17,723

*Included under: Counties having less than three producers.

^aIncluded in "Hollow building tile".

^bIncludes sewer pipe.

^cIncludes: Vitrified brick or block and face brick, \$629,460; sewer pipe, \$902,008; miscellaneous, \$31,975. The Census lists an additional miscellaneous item of \$75,789.

TABLE III Continued

VALUE OF CLAY PRODUCTS IN 1920.

County	No. of Producers	Common Brick	Drain Tile	Hollow Building Tile	Other Products ^a	Total Value
Allamakee	1	*	*	*		*
Appanoose	1	*				*
Audubon	1	*		*		*
Benton	4	\$ 5,840	\$ 54,378	\$ 19,628		\$ 79,846
Boone	2	*	*	*		*
Buena Vista	2	*	*			*
Cass	1	*	*	*		*
Cedar	1	*	*			*
Cerro Gordo	7	24,404	1,780,811	1,014,208		2,818,423
Clinton	1	*	*			*
Dallas	5	*	330,185	746,918	*	1,082,955
Des Moines	1		*			*
Dubuque	2	*				*
Floyd	1	*	*	*		*
Franklin	2	*	*	*		*
Grundy	1	*			*	*
Hancock	1		*			*
Hardin	1		*			*
Henry	2	*	*	*		*
Howard	1	*	*	*		*
Iowa	2	*	*	*		*
Jackson	1	*		*		*
Jasper	1	*	*			*
Jefferson	2		*			*
Johnson	2	*	*			*

TABLE III Continued

County	No. of Producers	Common Brick	Drain Tile	Hollow Building Tile	Other Products ^a	Total Value
Jones	2	*	*	*		*
Keokuk	5	*	196,598	*	*	452,541
Kossuth	1		*			*
Lee	1	*			*	*
Linn	1		*			*
Louisa	1	*	*	*		*
Madison	1		*			*
Marion	4	*	92,993	146,280	*	284,527
Mills	1	*				*
Muscatine	2	*				*
Page	1	*	*	*		*
Polk	8	121,296	278,387	*	*	1,200,330
Poweshiek	4		52,061	1,287		53,548
Sac	1		*			*
Scott	2		*	*	*	*
Story	2	*	*	*	*	*
Tama	4	*	39,365		*	81,257
Union	1	*	*	*		*
Wapello	3	90,158	*	*		202,133
Warren	1		*	*		*
Washington	4	3,495	81,857	25,838		111,190
Webster	8	28,955	274,621	388,311	428,711	1,144,062
Winneshiek	1	*				*
Woodbury	3	531,383				531,383
Wright	1		*			*
Counties with less than three producers		340,651	1,492,897	706,306	1,056,173	2,397,762
	109	\$1,146,182	\$4,760,115	\$3,048,776	\$1,484,884	\$10,439,957
Pottery, and clay sold						49,275

*Included under: Counties having less than three producers.

^aIncludes: Vitrified brick or block, \$176,430; Face brick, \$346,164; Sewer pipe, \$918,669; Flue lining, \$35,023; Wall coping, \$8,598.

LIMESTONE AND LIME.

The amount of limestone and lime sold in Iowa in 1919 was 519,030 tons, valued at \$567,356. The amount sold in 1920 was 620,665 tons with a value of \$840,544. These figures show a recuperation from the depression of 1918 when the output was valued at \$444,800, and reflect the improvement in business conditions. Much the larger part of the limestone output is crushed as is shown by the fact that in each of the two years a little over 379,000 tons was used in this way. The use of limestone in agriculture shows a gratifying increase, rising from 34,489 tons in 1918 to 46,452 tons in 1919 and to 67,140 tons in

1920. Insofar as this represents a necessity for reënriching wornout soils it is, of course, lamentable, but so far as it means the reclaiming of lands heretofore unsuitable for agriculture its use is extremely praiseworthy. As in previous years, so in these two, the only producers of lime were the Eagle Point Lime Works of Dubuque and the Alfred Hurst Estate of Maquoketa. One operator reported the sale of sandstone in 1920.

Iowa ranked thirty-third among the states in production of stone in 1919. She produced 0.8 per cent of the amount and 0.5 per cent of the value in that year. In the next year her rank was thirty-fourth with percentages of 0.8 of the amount and 0.6 of the value of the total production. She ranked twenty-seventh in amount of lime produced in 1919 and twenty-ninth in value. These positions were raised in 1920 to twenty-sixth in amount and twenty-seventh in value. The average value per ton in 1919 was \$9.79 and in 1920, \$10.80.

TABLE IV.

PRODUCTION OF LIMESTONE AND LIME IN 1919

County	No. of Producers	Build- ing Stone	Rubble and Riprap	Crushed Stone			Other Uses ^a	Total Value
				Road Making	Con- crete	Agricul- ture		
Allamakee	2	*	*				*	
Black Hawk	2	*			*		*	
Cerro Gordo	1		*			*	*	
Clayton	1		*				*	
Dubuque	6	*	\$4,000	\$10,980	\$22,954	*	\$63,084	
Hardin	1			14,678		*	*	
Henry	1		*		*		*	
Howard	1				*	*	*	
Jackson	1					*	*	
Jones	2		*		*	*	*	
Lee	3		*	*	*	*	56,786	
Linn	1				*		*	
Madison	2		*		*		*	
Marshall	1			*			*	
Pocahontas	1			*			*	
Scott	3		*		140,186	\$25,627	192,973	
Counties with less than three producers		\$1,816	79,301	34,615	151,272	5,727	\$76,200	
	29	\$1,816	\$83,301	\$60,273	\$314,412	\$31,354	\$76,200	\$567,356

^aIncludes: Lime, and stone sold for unspecified uses, \$58,898; stone sold for flux, railroad ballast and use in sugar factories, \$17,302.

TABLE IV Continued

PRODUCTION OF LIMESTONE AND LIME IN 1920.

County	No. of Producers	Build- ing Stone	Rubble and Riprap	Crushed Stone			Other Uses*	Total Value
				Road Making and Railroad Ballast	Con- crete	Agricul- ture		
Allamakee	2	*	*					*
Black Hawk ..	1				*			*
Cerro Gordo ..	2		*	*			*	*
Clayton	1						*	*
Clinton	1		*					*
Des Moines	1		*					*
Dubuque	6		\$28,807	\$10,343	*	*	*	\$94,521
Floyd	2		*				*	*
Hardin	1				*	*		*
Henry	1		*		*			*
Howard	1			*				*
Jackson	1		*			*	*	*
Jones	3		14,605	*	*	\$1,883	*	87,819
Lee	3		*		\$39,531	*		63,595
Linn	1			*	*			*
Madison	1		*		*	*		*
Mitchell	1						*	*
Pocahontas ..	1				*			*
Scott	4		*	*	212,369	36,506	*	291,850
Counties with less than three producers		*	119,864	17,135	209,546	8,251	\$127,604	537,785
	34	*	\$163,276	\$ 27,478	\$461,446	\$ 46,640	\$127,604	\$840,544

*Includes: Sandstone and lime, \$90,952; limestone sold for flux, \$12,902; for sugar factories, \$23,750.

SAND AND GRAVEL.

Iowa produced 2,093,471 tons of sand and gravel in 1919, and this had a value of \$1,383,764. The output for the next year was 2,467,644 tons valued at \$1,993,441. These figures show a substantial increase in spite of handicaps of car shortage and other industrial conditions. The statistics for 1920 show for the first time the various uses for which gravel is sold. These uses for Iowa gravel are:

	Quantity tons	Value
Building gravel	256,600	\$291,758
Roofing gravel	16,677	26,202
Paving gravel	499,072	521,360
Railroad ballast	191,914	46,486
	964,263	\$885,806

The tonnage of the sand produced during the years 1919 and 1920 was distributed as follows:

Kinds	1919		1920	
	Tons	Value	Tons	Value
Molding sand	6,405	\$ 14,318	10,566	\$ 13,254
Building sand	913,400	531,596	1,058,990	788,184
Engine sand	39,891	9,230	27,334	16,366
Paving sand	165,597	86,235	205,893	152,337
Filter sand	20,242	13,224	41,084	28,130
Other sands	142,253	72,952	159,514	109,364
Railroad ballast	50,394	19,712		
Gravel	755,289	636,497	964,263	885,806
	2,093,471	\$1,383,764	2,467,644	\$1,993,441

Table V. shows in as much detail as possible the production of sand and gravel in the different counties in 1919 and 1920.

TABLE V.
PRODUCTION OF SAND AND GRAVEL IN 1919

County	No. of Producers	Building Sand	Engine Sand and Railroad Ballast [‡]	Paving Sand	Other Sand ^a	Gravel	Quantity Tons	Value
Black Hawk	5	\$ 13,300	†	*	*	*	122,175	\$ 62,050
Boone	1	*	†	*	*	*	*	*
Bremer	2	*	*	*	*	*	*	*
Buena Vista	1	*	*	*	*	*	*	*
Butler	1	*	*	*	*	*	*	*
Carroll	1	*	*	*	*	*	*	*
Corro Gordo	2	*	†§	*	*	*	*	*
Cherokee	1	*	§	*	*	*	*	*
Clay	2	*	*	*	*	*	*	*
Clayton	1	*	*	*	*	*	*	*
Clinton	6	*	*	*	*	17,030	31,477	20,578
Des Moines	2	*	*	*	*	*	*	*
Dickinson	2	*	§	*	*	*	*	*
Dubuque	3	*	†	*	*	*	42,851	30,023
Emmet	2	*	*	*	*	*	*	*
Fayette	4	*	*	*	*	*	6,690	2,490
Franklin	3	7,355	*	*	*	*	5,907	7,355
Hardin	2	*	*	*	*	*	*	*
Humboldt	1	*	§	*	*	*	*	*
Ida	1	*	*	*	*	*	*	*
Jackson	2	*	*	*	*	*	*	*
Johnson	2	*	*	*	*	*	*	*
Jones	2	*	*	*	*	*	*	*
Lee	2	*	*	*	*	*	*	*
Linn	4	*	*	*	*	*	94,429	43,413
Lyon	2	*	*	*	*	*	*	*
Mahaska	2	*	*	*	*	*	*	*
Marion	2	*	§	*	*	*	*	*
Marshall	1	*	*	*	*	*	*	*

TABLE V Continued

County	No. of Producers	Building Sand	Engine Sand† and Railroad Ballast‡	Paving Sand	Other Sand*	Gravel	Quantity Tons	Value
Montgomery	1	*		*			*	*
Muscatine	2	*	†		*	*	*	*
O'Brien	6	*				*	18,099	\$5,935
Osceola	2	*					*	*
Palo Alto	2					*	*	*
Plymouth	3	*				*	31,887	20,869
Polk	14	107,877	†	35,460	5,944	103,917	378,243	258,457
Sac	2	*				*	*	*
Scott	2	*				*	*	*
Sioux	5	*				*	31,601	23,255
Story	2					*	*	*
Van Buren	1	*					*	*
Wapello	3	*	†	*	*	*	111,032	68,783
Webster	3	*				*	17,381	15,400
Winneshiek	2	*				*	*	*
Woodbury	1	*				*	*	*
Wright	2	*				*	*	*
Counties with less than three producers....		403,064	28,942	50,775	94,550	515,550	1,323,874	887,206
	116	\$ 531,596	\$ 28,942	\$ 86,235	\$ 100,494	\$ 636,497	2,093,471	\$1,383,764

*Includes: Molding sand, \$14,318; grinding and polishing, fire or furnace sand, \$7,637; filter sand, \$13,224; unclassified, \$65,315.

†Included under: Counties with less than three producers.

‡Engine sand, \$9,230; railroad ballast, \$19,712.

SAND AND GRAVEL IN 1919

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TABLE V Continued
 PRODUCTION OF SAND AND GRAVEL IN 1920

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County	No. of Producers	Building Sand	Engine Sand and Railroad Ballast ‡	Paving Sand	Other Sand*	Gravel	Quantity Tons	Value
Adair	1	*					*	*
Black Hawk	5	\$ 46,800	†		*		84,440	\$ 66,484
Boone	1	*	†				*	*
Bremer	2	*		*			*	*
Buena Vista	1						*	*
Butler	2	*	§				*	*
Cerro Gordo	1	*	†§	*	*		*	*
Cherokee	3	*	§		*		275,141	92,058
Clay	1				*		*	*
Clayton	1						*	*
Clinton	4	*	†	*		14,675	25,097	19,300
Des Moines	2	*		*			*	*
Dubuque	2	*					*	*
Emmet	2	*					*	*
Fayette	4	*			*	31,025	51,057	41,275
Franklin	3	3,165					8,977	3,165
Hardin	1	*					*	*
Harrison	1	*			*	*	*	*
Humboldt	1	*		*	*	*	*	*
Ida	1	*					*	*
Jackson	3	*	§			*	24,805	16,035
Johnson	3	*				*	20,557	18,210
Jones	1	*					*	*
Linn	4	*				*	101,946	63,199
Lyon	2		§			*	*	*
Mahaska	1	*		*	*	*	*	*
Marion	1	*					*	*
Marshall	1	*		*			*	*
Muscatine	4	76,964	†	*	7,570	39,140	156,100	128,908

MINERAL PRODUCTION IN 1919 AND 1920

TABLE V Continued

County	No. of Producers	Building Sand	Engine Sand and Railroad Ballast [‡]	Paving Sand	Other Sand [*]	Gravel	Quantity Tons	Value
O'Brien	4	7,867					6,436	7,867
Osceola	3	*	§			*	15,664	6,707
Palo Alto	1	*					*	*
Plymouth	3	*				*	22,121	18,419
Polk	12	149,669	†9,151	74,951	54,934	180,450	524,607	469,155
Sac	2	*			*	*	*	*
Scott	2	*					*	*
Sioux	5	35,940	†	*	35,000	*	79,944	77,940
Wapello	4	36,688	†	*	15,359	16,225	88,271	79,584
Webster	4	*		*		*	35,974	40,999
Winneshiek	2	*		*		*	*	*
Woodbury	1	*				*	*	*
Wright	2		§		*		*	*
Counties with less than three producers....		357,093	53,701	77,386	37,885	557,805	1,511,137	844,136
	104	\$ 788,184	\$ 62,852	\$ 152,337	\$ 150,748	\$ 839,320	2,467,644	\$1,993,441

*Included under: Counties having less than three producers.

†Engine sand, \$16,366; §Railroad ballast sand, \$46,486.

*Includes: Molding and grinding sand, \$16,502; Filter sand, \$28,180; Uses not specified, \$106,016.

SAND AND GRAVEL IN 1920

GYPSUM.

The statement was made in the report on mineral production for 1918 that the amount of gypsum mined in Iowa in that year was 29 per cent less than in the year before and that the value of the output was 5 per cent less than in 1917. In 1919, on the contrary, the quantity mined was 28 per cent greater than that of 1918 while the increase in value amounted to 35 per cent. The tonnage of the gypsum mined in 1919 was 421,279, as compared with 327,927 in 1918. Iowa shared with other states in the return to larger production and higher prices following the postwar decline. In 1920, again, the upward trend is shown, for the tonnage in that year amounted to 571,895. Perhaps the most remarkable feature of the situation, however, is the phenomenal rise in value of finished product as shown by increase from \$1,946,414 in 1918 to \$2,634,444 in 1919 and \$4,422,965 in 1920. The great increase is ascribed to the increased costs of production and to the large increase in the manufacture of gypsum board.

The following table presents the details of the industry for the two years here considered.

VALUE OF GYPSUM PRODUCED IN IOWA.

	1919		1920	
	Tons	Value	Tons	Value
Crude gypsum mined.....	421,279		571,895	
Sold crude—				
to Portland cement mills.....	66,619	\$ 222,672	69,435	\$ 252,593
as land plaster.....	2,405	8,760	41,404	161,838
Total sold crude.....	69,024	231,432	110,839	414,431
Sold calcined—				
as stucco.....	10,750	76,472	12,646	120,780
as mixed wall plaster.....	208,829	1,754,815	219,107	2,328,744
as plaster of Paris, Keene's cement, dental plaster, to plate glass works.....	874	11,063	Plaster of Paris 953	13,482
as boards, tile or block.....	44,203	560,662	Others 482	8,368
			boards 41,534	968,607
			tile &c. 46,678	568,253
Total sold calcined.....	264,656	2,403,012	Total 88,212	1,537,160
Total value.....		2,634,444	321,400	4,008,534
				4,422,965

A striking feature of the statistics is the large amount of raw gypsum which was sold in 1920 for agricultural uses. This was

a much larger quantity than had been sold in any previous year. The small amount sold in 1919 was in line with conditions all over the country. The sale of raw gypsum to cement mills was about the same in Iowa during the two years. The following table shows the amounts of crude gypsum sold in the United States in 1919 and 1920 in short tons.

State	AGRICULTURE		CEMENT	
	1919	1920	1919	1920
Iowa	2,405	41,404	66,619	69,435
Michigan	1,597	12,092	48,798	52,705
Nevada	(a)	(a)	(a)	13,043
New York	5,458	15,510	210,959	255,567
Ohio	1,435	(a)	6,290	8,474
Oklahoma	(a)	(a)	24,761	(a)
Texas	(a)	(a)	10,637	16,900
Other States	29,083	38,437	93,744	125,777
	39,978	107,443	461,808	541,901

(a) Included with "Other States".

Virginia produced nearly 50 per cent of the agricultural gypsum sold in 1919, with New York and Iowa occupying second and third places. In 1920 Iowa took first rank. Much of Virginia's output goes to the improvement of her peanut crop. The average price per ton received for agricultural gypsum in 1919 was \$4.64, and in 1920, \$5.19. Prices of gypsum used in cement were \$2.83 in 1919 and \$3.58 in 1920.

The total output of calcined gypsum in the United States during these two years was as follows:

State	1919			1920		
	Sold calcined		Total Value	Sold calcined		Total Value
	Tons	Value		Tons	Value	
Iowa	264,656	\$ 2,403,012	\$ 2,634,444	321,400	\$ 4,008,534	\$ 4,422,965
Kansas	52,994	481,561	520,673	78,347	864,334	968,298
Michigan	250,687	2,216,257	2,390,367	261,499	3,252,060	3,521,028
Nevada	63,973	474,334	497,561	105,280	1,036,158	1,100,261
New York	316,767	2,910,404	3,530,743	387,856	5,451,426	6,438,929
Ohio	219,900	2,022,987	2,049,723	220,903	2,122,223	2,161,038
Oklahoma	71,986	644,537	708,660	69,924	772,749	816,768
Texas	130,642	1,064,264	1,080,754	164,956	1,391,382	1,439,491
Wyoming	37,314	282,587	282,587	43,384	410,599	410,724
Others (a) ..	187,101	1,709,761	2,032,395	250,935	2,658,405	3,253,563
	1,596,020	14,209,704	15,727,907	1,904,484	21,967,870	24,533,065

(a) Alaska, Arizona, California, Colorado, Montana, New Mexico, Oregon, South Dakota, Utah, Virginia.

The production of gypsum boards and blocks has grown from 116,535 tons in 1916, valued at \$246,037, an average of \$2.11 per ton, to 308,756 tons in 1920, valued at \$6,091,617, an average price of \$19.73 per ton. The amount of gypsum used in boards and blocks in 1920 was nearly equal but the boards were valued at about twice as much as the blocks.

In 1920 the Beaver Board Company of Buffalo, New York, purchased the capital stock of the American Cement Plaster Company of Chicago, which operates a plant at Fort Dodge. The American will continue to operate its plants and manufacture the same products as in the past.

The Centerville Gypsum Company resumed operations on May 23, 1919, and operated until November 11, when work was suspended because of a labor strike. Work was resumed early in 1920 and has continued since.

The active plants operating in Iowa are: The Centerville Gypsum Company, Centerville; American Cement Plaster Division, Plymouth Gypsum Company, U. S. Gypsum Company, Wasem Plaster Company and the Cardiff Gypsum Plaster Company, all of Fort Dodge.

The annual reports of this Survey for 1917 and 1918 include a very comprehensive monograph on gypsum prepared by Dr. Frank A. Wilder, at one time State Geologist, which describes the subject in all its aspects, geologic, chemical, economic and technologic. Copies of this report are available on request.

CEMENT.

Nearly every producing state in the Union showed an increase in the production of Portland cement in 1919 over 1918, but Iowa proved to be the one exception. The increases ranged from 6 to 37 per cent while the Iowa output fell off 1 per cent. However, during the same period the shipments increased by 43 per cent in Iowa, while the average increase for the nation was 21 per cent. This condition was reversed in 1920, for the Iowa production of that year exceeded that of 1919 by 36 per cent, while shipments were 3 per cent less in 1920. The detailed figures are given below.

CEMENT IN THE UNITED STATES

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	1918	1919	1920
Production, bbls.....	3,626,455	3,573,278	4,849,228
Stock, Dec. 31, bbls.....	1,055,540	126,162	553,607
Shipments, bbls.....	3,188,669	4,569,110	4,421,783
Shipments, value.....	\$5,423,926	\$7,798,347	\$8,742,854
Ave. factory price per bbl.....	\$1.70	\$1.71	\$1.98
Consumption, bbls.....	2,298,157	3,362,263	3,360,089
Population, est.....	2,224,771	2,404,021	2,422,485
Est. consumption per capita, bbls.	1.03	1.40	1.39

Of course the Lehigh district of eastern Pennsylvania and western New Jersey is the greatest producing district in the United States, producing about one-fourth of the Nation's total, from twenty plants, but it is worthy of note that Iowa, a relatively new producer, and in an agricultural region, stands eighth among the states and that the geographic district in which Iowa is grouped, and which includes Minnesota and Missouri, produces nearly one-eighth of the total output. It is excelled only by the Lehigh district and by the Illinois and western Indiana district. The 1920 production of these three districts in barrels was: Lehigh, 25,417,804; Illinois and western Indiana, 13,106,011; Minnesota, Iowa and Missouri, 12,406,745. The four Iowa plants have an annual capacity of 5,350,000 barrels. It will be seen that this capacity was not nearly reached in the production of either year here discussed. The production in the ten leading states is shown in the following table:

State	Active plants		Production		Shipments	
			Quantity	Barrels	1919	
	1919	1920	1919	1920	Quantity barrels	Value
Pennsylvania	21	21	25,325,173	28,269,314	26,250,077	\$ 43,126,528
Indiana	5	6	7,262,454	10,787,751	7,667,976	12,527,770
California	8	9	4,642,679	7,098,084	4,743,336	8,860,196
Missouri	5	5	5,216,347	6,017,517	5,496,164	9,264,017
New York	8	9	4,383,579	5,885,058	4,441,250	7,700,406
Illinois	4	4	4,206,918	5,538,558	4,873,831	7,901,689
Michigan	11	11	4,675,244	4,891,457	4,990,308	8,468,196
Iowa	4	4	3,573,278	4,849,228	4,569,110	7,798,347
Kansas	7	7	2,927,270	4,340,794	3,023,901	5,467,284
Texas	3	5	2,249,735	2,562,208	2,318,747	4,226,222
Total for U. S....	111	117	80,777,935	100,023,245	85,612,899	146,734,844

State	Shipments, Cont.				Consumption			
	1920		Average factory price per barrel		1919		1920	
	Quantity barrels	Value	1919	1920	Barrels	Per capita	Barrels	Per capita
Pennsylvania	27,662,116	\$ 52,632,082	\$1.64	\$1.90	7,571,085	.87	8,582,057	.97
Indiana	10,191,126	18,649,115	1.63	1.83	3,135,162	1.07	2,935,056	.99
California	7,064,010	15,449,645	1.87	2.19	3,900,436	1.14	5,832,977	1.65
Missouri	5,605,952	10,980,453	1.69	1.96	1,932,119	.57	2,525,087	.74
New York	6,049,150	12,206,698	1.73	2.02	7,078,888	.68	8,663,051	.82
Illinois	5,148,040	10,012,158	1.62	1.94	6,154,227	.95	7,407,388	1.13
Michigan	4,442,455	10,939,633	1.70	2.46	5,097,575	1.39	5,142,945	1.37
Iowa	4,421,783	8,742,854	1.71	1.98	3,362,263	1.40	3,360,089	1.39
Kansas	4,158,399	8,649,157	1.81	2.08	1,900,921	1.07	2,341,323	1.32
Texas	2,626,130	5,898,972	1.82	2.25	1,981,500	.42	2,450,278	.52
Total for U. S.*	96,311,719	\$194,439,025	\$1.71	\$2.02	88,814,535	.77	94,001,085	.86

*Other producing states are: Alabama, Colorado, Georgia, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Ohio, Oklahoma, Oregon, Tennessee, Utah, Virginia and West Virginia.

It seems that the relation between production or shipments and consumption is not very close, either as to the total used or as to per capita consumption. Iowa ranks ninth in total consumption and fourth in per capita amount. The lowest rank for per capita consumption is held by Mississippi with a figure of 0.15 barrel, while the highest rank is that of Arizona whose consumption is 1.86 barrels per inhabitant. The greatest consumer, naturally, is New York, with Pennsylvania, Illinois, Ohio and California succeeding in the order named.

The figures for the production of concrete stone and block in Iowa are combined in part with those for Kansas, to avoid revealing individual production. However, these figures show that as in previous years Iowa is one of the leading states in the manufacture of these products. In 1919 she ranked fourth and in 1920 had risen to first place. The data are given in the table below. Of course the values here given are not to be included in total values for the state as both cement and aggregate have been accounted for elsewhere.

Kind	1919		1920	
	Quantity Cu. ft.	Value	Quantity Cu. ft.	Value
Architectural stone	27,315 ^a	\$ 45,487 ^a	6,358	\$ 12,873
Concrete blocks	1,368,639	431,254	888,663	402,606
Concrete brick	9,655	4,496	10,633	6,276
Silo blocks and staves	136,470 ^a	82,898 ^a	66,330	60,994
Miscellaneous		176,561		914,517
Total		\$706,146	971,984	\$1,397,266

(a) Includes figures for Kansas.

The total production of these materials for the United States was \$7,901,105 in 1919 and \$9,899,576 in 1920. Ohio, Illinois, Indiana, Iowa and Michigan were the five leaders in 1919, with rank as given, and Iowa, Ohio, Minnesota, Indiana and Illinois were the chief producers in 1920, in the order given.

MINERAL WATERS.

The reported output of mineral waters sold in Iowa for table or medicinal use in 1919 was 39,661 gallons, valued at \$5,703, as compared with 87,703 gallons sold for \$3,937, in 1918. These figures show a decrease in quantity of 55 per cent but an increase in value of 45 per cent. The 1919 output came from four springs: Fry's and the Grand Hotel at Colfax, Hawkeye Hygeia at Sioux City, and Lime Rock at Dubuque. The average price received rose from four cents in 1918 to fourteen cents per gallon in 1919. In addition these springs and the Crystal spring of Estherville used 321,500 gallons of water for soft drinks.

The output for 1920 was a little less than that for 1919. The table and medicinal water sold amounted to 38,877 gallons, valued at \$3,419. This represents a decrease of 2 per cent in quantity and 40 per cent in value, as the average price received was only nine cents per gallon. The water used for soft drinks amounted to 197,183 gallons. The list of producing springs was the same as that of 1919, with the addition of the Egralharve Mineral Spring at Okoboji, which was not used the preceding year.

POTASH.

The statistics for 1919 include 89 short tons of potash (K₂O)

with a value of \$20,025. This was derived from Steffens waste water at beet sugar factories. No production was reported for 1920.

NATURAL GAS.

The production of natural gas from shallow wells in the glacial drift was continued during the years here discussed and amounted in 1919 to 740,000 cubic feet with a value of \$185 and in 1920 to 827,000 cubic feet valued at \$290. All was used locally, as none is carried to any distance for consumption. The average price is twenty-five cents per thousand cubic feet.