
**MINERAL PRODUCTION IN IOWA
FOR 1916**

BY GEORGE F. KAY



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VALUE OF MINERAL PRODUCTION.

1914.

Coal	\$13,364,070
Clay and clay products	6,405,995
Stone and lime	594,681
Gypsum	1,321,457
Lead and zinc
Mineral waters	30,179
Sand and gravel	556,868
Cement	4,008,915
*Other products	19,700
Total	\$26,301,865

1915.

Coal	\$13,577,608
Clay and clay products	6,749,088
Stone and lime	577,295
Gypsum	1,278,128
Lead and zinc
Mineral waters	18,534
Sand and gravel	720,795
Cement	4,119,952
*Other products	21,550
Total	\$27,062,950

1916.

Coal	\$13,530,383
Clay and clay products	7,375,716
Stone and lime	610,534
Gypsum	1,496,795
Lead and zinc	7,560
Mineral waters	14,404
Sand and gravel	980,272
Cement	5,063,647
**Other products	79,597
Total	\$29,158,908

¹Sand-lime brick, mineral paints and natural gas.

**Mineral paints, natural gas, iron ore.

¹The mineral statistics were compiled by the Iowa Geological Survey in co-operation with the United States Geological Survey.

In 1916 the value of the mineral production in Iowa was \$29,158,908, which is the highest figure of record for the state, exceeding the value for the previous year by \$2,095,958. The following table shows the value of Iowa's mineral output during each of the past ten years:

VALUE OF MINERAL PRODUCTION IN IOWA FOR THE YEARS 1907 TO
1916 INCLUSIVE.

1907	\$17,627,925
1908	18,090,447
1909	20,365,721
1910	22,744,572
1911	21,119,111
1912	22,910,066
1913	25,612,345
1914	26,301,865
1915	27,062,950
1916	29,158,908

From this table it will be seen that the value of the output in 1916 exceeded the value of a decade earlier by \$11,530,983, an increase of more than 65 per cent. With the exception of the year 1911 the value of each year of the past ten years has been greater than that of the preceding year.

The four most important products of Iowa in order of their value of production are coal, clay and clay products, cement, and gypsum. These products in 1916 had a value of \$27,466,541, which is more than 90 per cent of the value of all the mineral products of the state. The values of clay and clay products, stone and lime, gypsum, sand and gravel, and cement were greater in 1916 than in 1915, but the values of coal and mineral waters were somewhat less than in 1915. Iron ore was mined in 1916 for the first time in the history of the state.

The number of mineral producers in Iowa for 1916 was 523; the number in 1915 was 540.

The total production by counties for 1916 is given in Table I.

TABLE I
VALUE OF TOTAL MINERAL PRODUCTION, BY COUNTIES FOR 1916

Counties	No. of Producers	Coal	Clay and Clay Products	Stone and Lime	Sand and Gravel	Other Products	Total
Adair	1		*				*
Adams	4	\$ 31,787					\$ 31,787
Allamakee	3			*		*	*
Appanoose	53	2,416,033	*				2,416,033
Audubon	2		*				*
Benton	5		\$ 60,620				60,620
Black Hawk	10			\$ 23,110	\$ 29,700		52,810
Boone	12	411,062	*		*		582,024
Bremer	4				730		730
Buena Vista	5		28,950		*		28,950
Butler	1				*		*
Calhoun							
Carroll	1				*		*
Cass	1		*				*
Cedar	1		*				*
Cerro Gordo	13		1,943,530	*	74,969	*	5,613,225
Cherokee	2				*		*
Chickasaw							
Clay	1		*				*
Clayton	5			7,880	*		7,880
Clinton	8		*	*	19,253		30,169
Dallas	10	890,011	315,292				1,205,303
Delaware	1		*				*
Des Moines	5		*	*	21,515		29,867
Dickinson	2				*		*
Dubuque	15		*	52,41	31,144		83,563
Emmet	1				*		*
Fayette	4		*		17,901		17,901
Floyd	3		*	*	*		126,047
Franklin	6		*		1,192		1,192
Fremont							
Greene	3	17,110					17,110
Grundy	1		*				*
Guthrie	3	*	*				*
Hamilton	2		*				*
Hancock	1		*				*
Hardin	6		*	*	*		126,504
Harrison	1			*			*
Henry	2		*				*
Howard	3		*	*	*		6,510
Humboldt	1		*				*
Ida	1				*		*
Iowa	2		*				*
Jackson	3			*	*		39,550
Jasper	11	465,449	22,866			*	488,315
Jefferson	6	*	37,804			*	37,804
Johnson	4		*		*		22,887
Jones	8		*	61,760	*		74,802
Keokuk	8	*	274,719		*		274,719
Kossuth	2		*		*		*

TABLE I—CONTINUED.

Counties	No. of Producers	Coal	Clay and Clay Products	Stone and Lime	Sand and Gravel	Other Products	Total
Lee.....	9		6,898	61,434	*		68,332
Linn.....	11		7,010	13,204	36,232		56,446
Louisa.....	3		*	*		\$ 275	275
Lucas.....	2	*					*
Lyon.....	2				*		*
Madison.....	2			*			*
Mahaska.....	12	300,694	*				300,694
Marion.....	16	583,367	120,047		25,413		728,827
Marshall.....	4		*	*			90,137
Mills.....	4		4,830				4,830
Mitchell.....	2			*			*
Monroe.....	22	2,943,370	*				2,943,370
Montgomery.....	1			*			*
Muscatine.....	9		19,116	*	53,753		72,869
O'Brien.....	4				2,886		2,886
Osceola.....	2				*		*
Page.....	3	*	*				20,587
Palo Alto.....	3				14,278		14,278
Plymouth.....	5		*		14,240		14,240
Pocahontas.....	1			*			*
Polk.....	47	3,393,381	971,911		251,019	*	4,616,311
Pottawattamie.....	3		15,527				15,527
Poweshiek.....	5		34,030				34,030
Sac.....	3		*		*		152,960
Scott.....	11		*	146,359	*	*	174,928
Sioux.....	5				31,900		31,900
Story.....	5		*		5,845		5,845
Tama.....	5		55,809				55,809
Taylor.....	2	*					*
Union.....	1		*				*
Van Buren.....	9	10,625	*	270	*		11,915
Wapello.....	19	597,637	86,363	*	38,729	*	722,729
Warren.....	4	*	*				127,946
Washington.....	7		51,730	*			51,730
Wayne.....	2	*					*
Webster.....	15	*	1,332,411		9,121	*	1,372,061
Winnebago.....	2		*		*		*
Winneshiek.....	3		*		*		14,187
Woodbury.....	5		*		*	*	495,701
Wright.....	4		*		3,271		3,271
County values representing less than three producers and small coal mines.....		1,469,857	1,986,253	244,098	297,181	6,661,728	5,577,985
Totals.....	523	\$13,530,333	\$ 7,375,716	\$ 610,534	\$ 980,272	\$6,662,003	\$29,158,908

*Included in county values and totals.

COAL.

Coal has been for many years the chief mineral mined in Iowa, the yearly output having varied up and down between 7,000,000 and 8,000,000 tons. In 1916 the production was 7,260,800 tons, which had a value of \$13,530,383 at the mines. These figures are somewhat less than for the year 1915, when the output was 7,614,143 tons, with a value of \$13,577,608. In 1916 coal was mined in twenty-one counties in Iowa, the three chief producing counties in order of production being Monroe county, 1,772,614 tons; Polk county, 1,719,844 tons; and Appanoose county, 1,227,127 tons. The next five counties in order of production were Lucas, Dallas, Marion, Wapello, and Jasper. Together these five counties produced a little more than two million tons.

The chief use of Iowa coal is by the railways and for domestic purposes.

The number of men employed in coal mining in 1916 was 14,443.

The output, disposition of product, value, average price per ton, average number of days worked, and average number of men employed in 1916 are given, tabulated by counties, in Table II.

TABLE II

COAL PRODUCTION FOR IOWA IN 1916, BY COUNTIES, IN SHORT TONS.

Counties	Loaded at Mine for Shipment	Sold to Local Trade and Used by Employees	Used at Mine for Steam and Heat	Total Quantity	Total Value	Average Price Per Ton	Average Number of Days Active	Average Number of Employees
Adams -----	*	10,663	*	11,703	\$ 31,787	\$2.71	204	50
Appanoose -----	1,140,041	68,184	18,902	1,227,127	2,416,033	1.96	182	3,719
Boone -----	116,775	48,607	5,200	170,582	411,062	2.40	180	413
Dallas -----	445,039	26,432	*	473,971	890,011	1.87	232	770
Greene -----		6,768	*	6,793	17,110	2.52	145	31
Jasper -----	*	11,961		232,825	465,449	1.99	214	436
Mahaska -----	145,143	12,990	*	159,395	300,694	1.88	201	302
Marion -----	320,087	25,169	16,544	361,800	583,367	1.61	202	693
Monroe -----	1,689,158	36,160	47,296	1,772,614	2,943,370	1.66	183	3,532
Polk -----	1,431,595	249,645	38,604	1,719,844	3,393,381	1.97	238	2,667
Van Buren -----	*	4,586		5,061	10,625	2.09	202	18
Wapello -----	291,656	21,831	2,845	316,332	597,637	1.88	210	551
*Counties with less than three producers and small mines -----	951,274	68,721	183,157	802,753	1,469,857			1,261
Total -----	6,530,763	591,717	312,548	7,260,800	13,530,353			14,443

*Guthrie, Jefferson, Keokuk, Lucas, Page, Taylor, Warren, Wayne, Webster.

Iowa's rank as a coal producing state in 1916 is given in the following table. From this table it is seen that Iowa ranked eleventh in tonnage, and ninth in value.

THE LEADING COAL PRODUCING STATES IN 1916 WITH QUANTITY AND VALUE OF PRODUCT².

State	Quantity (short tons)	Value
Pennsylvania:		
Anthracite.....	87,578,493	\$202,009,561
Bituminous.....	170,295,424	221,685,175
West Virginia.....	86,460,127	102,366,092
Illinois.....	66,195,336	82,457,954
Ohio.....	34,728,219	46,150,907
Kentucky.....	25,393,997	30,193,047
Indiana.....	20,093,528	25,506,246
Alabama.....	18,086,197	24,859,831
Colorado.....	10,484,237	16,964,104
Virginia.....	9,707,474	10,261,424
Wyoming.....	7,910,647	12,239,707
Iowa.....	7,260,800	13,530,383

²From advance Chapters of Mineral Resources of the United States for 1916.

CLAY AND CLAY PRODUCTS.

The value of clay and clay products in Iowa in 1916 was \$7,375,716, a figure that has not been exceeded in the history of the clay industry in the state. Previous to 1916, the year 1915 held the record for value of production, in which year the value was \$6,749,088.

The following table shows the value of clay and clay products in Iowa during each year from 1907 to 1916:

PRODUCTION OF CLAY AND CLAY PRODUCTS IN IOWA FROM 1907 TO 1916.

Year	Value
1907	\$ 3,733,476
1908	4,078,627
1909	4,916,513
1910	5,335,036
1911	4,436,839
1912	4,524,492
1913	5,575,581
1914	6,405,996
1915	6,749,088
1916	7,375,716

The distribution of output in 1916, with the distribution in 1915, for comparison, is as follows:

Product	1915		1916	
	Quantity in thousa'ds	Value	Quantity in thousa'ds	Value
Common brick.....	125,752	\$ 898,851	132,676	\$ 947,247
Vitrified brick or block.....	30,573	300,785	24,265	393,038
Face brick.....	11,916	153,324	22,112	283,559
Drain tile.....		3,802,599		3,986,163
Sewer pipe.....		448,721		494,428
Fireproofing.....		1,008,457		1,141,291
Other products.....		130,878		127,563
Clay.....		5,473		2,427
Total.....		\$6,749,088		\$7,375,716

The clay product in 1916 is tabulated by counties in Table III, in which the distribution of the leading products is given.

TABLE III
 VALUE OF IOWA CLAY AND CLAY PRODUCTS FOR 1916.
 TABULATED BY COUNTIES.

Counties	No. of Producers	Common Brick	Paving Brick or Block	Face Brick	Drain Tile	Other Products	Total Value
Adair	1	*			*		*
Appanoose	1	*					*
Audubon	2	*			*	*	*
Benton	6	\$2,912			\$ 40,699	\$ 17,009	\$ 60,620
Boone	2	*	*	*	*	*	*
Buena Vista	3	*			28,450		28,950
Cass	2	*				*	*
Cedar	1	*			*		*
Cerro Gordo	7	13,044	*		1,535,170	328,804	1,943,530
Clay	1	*			*		*
Clinton	2	*			*		*
Dallas	6	581	*	*	222,068	71,683	315,292
Delaware	1	*					*
Des Moines	1	*					*
Dubuque	2	*					*
Fayette	1	*				*	*
Floyd	1	*			*	*	*
Franklin	1	*			*	*	*
Grundy	1	*		*			*
Guthrie	1	*			*	*	*
Hamilton	2	*			*	*	*
Hancock	1				*		*
Hardin	1				*		*
Henry	2	*			*	*	*
Howard	1	*			*		*
Humboldt	1				*		*
Iowa	2	*			*		*
Jasper	4	4,395			18,471		22,866
Jefferson	3	*			32,416	*	37,804
Johnson	2	*			*		*
Jones	3	*			*	*	*
Keokuk	7	*			224,979	*	274,719
Kossuth	1				*		*
Lee	3	5,098		*			6,898
Linn	3	*			5,922		7,010
Louisa	1	*			*	*	*
Mahaska	2	*	*	*	*	*	*
Marion	4	7,150			18,460	*	120,047
Marshall	2	*			*	*	*
Mills	4	4,830					4,830
Monroe	1				*	*	*
Muscatine	4	12,666		*	*	*	19,116
Page	2	*			*	*	*
Plymouth	1	*					*
Polk	10	167,729	*	101,252	184,027	*	971,911
Pottawattamie	3	13,347			*	*	15,527
Poweshiek	5	798			29,073	4,159	34,030
Sac	1	*			*	*	*

TABLE III—CONTINUED.

Counties	No. of Producers	Common Brick	Paving Brick or Block	Face Brick	Drain Tile	Other Products	Total Value
Scott	3	*			*	*	*
Story	2	*	*		*	*	*
Tama	6	14,625		*	26,447	*	55,809
Union	1	*			*	*	*
Van Buren	2	*					*
Wapello	3	42,600	*	7,473	*	*	86,363
Warren	2	*			*	*	*
Washington	6	8,577			32,313	10,840	51,730
Webster	10	58,638	87,194		700,316	486,263	1,332,411
Winnebago	1				*		*
Winneshiek	1	*					*
Woodbury	2	*		*		*	*
Wright	1	*			*		*
**Pottery and Clay sold							6,427
Counties with less than three producers		590,253	305,844	174,834	887,352	840,524	1,979,826
Totals		947,247	393,038	283,559	3,986,163	1,759,282	7,375,716

*Includes sewer pipe, fire-proofing, etc.

*Included in "Counties with less than three producers."

**Hardin, Muscatine and Webster counties.

The following table shows the rank of the ten leading states in value of clay products in 1916. It includes also the number of operating firms and the percentage of the total value produced by each of the ten states.

TEN LEADING STATES IN VALUE OF CLAY PRODUCTION IN 1916.

State	Rank	No. of Operating Firms Reporting	Value Not Including Raw Clay Sold	Percentage of Total Value
Ohio	1	500	\$44,947,877	21.69
Pennsylvania	2	348	32,110,690	15.49
New Jersey	3	144	20,814,402	10.04
Illinois	4	225	17,633,351	8.51
New York	5	186	11,755,012	5.67
Indiana	6	199	9,667,313	4.66
Missouri	7	83	7,640,995	3.69
West Virginia	8	61	7,634,321	3.68
Iowa	9	153	7,379,289	3.56
California	10	79	4,163,426	2.01

Advance Chapter from Mineral Resources of the United States for 1916.

From this table it will be seen that Iowa ranked ninth among the states of the country.

The three principal clay products in order of value in 1916 were drain tile, fireproofing, and common brick. Cerro Gordo county continued to be the chief producer of clay and clay products, the value of the output in 1916 being \$1,943,530, to which value drain tile alone contributed \$1,535,170.

The value of drain tile and common brick sold in Iowa in the past ten years has been as follows:

PRODUCTION OF DRAIN TILE AND COMMON BRICK IN IOWA FROM
1907 TO 1916.

Year	Drain Tile	Common Brick
1907.....	\$2,011,793	\$1,085,383
1908.....	2,522,363	896,890
1909.....	2,830,910	1,072,340
1910.....	3,457,455	1,088,266
1911.....	2,468,962	1,025,011
1912.....	2,293,084	1,017,097
1913.....	2,798,816	1,052,036
1914.....	3,180,836	1,067,746
1915.....	3,802,599	898,851
1916.....	3,986,163	947,247

STONE AND LIME.

The value of stone and lime produced in Iowa in 1916 was \$610,534. The distribution of output in 1916, with the distribution in 1915 for comparison, is as follows:

	1915	1916
Limestone—	\$ 32,665	\$ 12,018
Building.....	106,054	93,259
Riprap and rubble.....		
Crushed stone—	28,315	11,374
Road making.....	78,886	76,929
Railroad ballast.....	261,541	342,082
Concrete.....	28,185	25,353
*Other purposes.....	41,120	49,450
Lime.....		
Total limestone and lime.....	\$576,776	\$610,465
Sandstone.....	519	69
Total stone and lime.....	\$577,295	\$610,534

*Paving, curbing, flagging, etc.

The distribution of limestone in 1916 is given by counties in Table IV.

TABLE IV
 PRODUCTION OF LIMESTONE AND LIME IN 1916.

Counties	Number of Producers	Building Stone	Riprap and Rubble	Crushed Stone			Lime	Other Uses	Total Value
				Road Making	Rail-road Ballast	Concrete			
Allamakee	2	\$ *	\$ *	\$	\$	\$	\$	\$ *	
Black Hawk	4	*	*			22,252		23,110	
Cerro Gordo	1		*				*	*	
Clayton	4	*	*			*	*	7,880	
Clinton	1	*	*				*	*	
Des Moines	1		*					*	
Dubuque	8	*	14,144	4,980	*	10,320	*	52,419	
Floyd	1					*	*	*	
Hardin	2					*	*	*	
Harrison	1			*		*		*	
Howard	1	*				*		*	
Jackson	2			*			*	*	
Jones	5	1,497	16,719	*		41,746	709	61,760	
Lee	5	*	22,643	*	*	32,930	*	61,434	
Linn	3			*	*	*	*	13,204	
Louisa	1	*						*	
Madison	2		*			*	*	*	
Marshall	2		*	*	*	*		*	
Mitchell	2	*			*		*	*	
Montgomery	1					*		*	
Muscatine	1		*					*	
Pocahontas	1					*		*	
Scott	5		20,644	*	*	117,822	*	146,359	
Van Buren	3	270						270	
Wapello	1		*					*	
Washington	1					*		*	
Counties with less than three producers		\$ 10,251	\$ 28,324	\$ 6,394	\$ 76,929	117,012	49,450	15,429	244,098
Total		\$ 12,018	\$ 102,474	\$ 11,374	\$ 76,929	\$ 342,082	\$ 49,450	\$ 16,138	\$ 610,534

*Included in "Counties with less than three producers."

SAND AND GRAVEL.

The value of sand and gravel produced in Iowa in 1916 was \$980,272. The value of output for the previous year was \$720,795.

The sand and gravel sold in 1916 may be classified as follows, and in order that comparison may be made with 1915, the classification for that year is given also:

Kind	1915	1916
Sand used for—		
Moulding.....	\$ 160	\$ 3,080
Building.....	262,587	388,080
Engine.....	9,353	5,296
Other sand.....	135,368	274,517
Gravel.....	313,327	309,299
Total sand and gravel.....	\$ 720,795	\$ 980,272

Table V shows the distribution of sand and gravel by counties in 1916:

TABLE V
VALUE OF SAND AND GRAVEL PRODUCED IN IOWA IN 1916.

Counties	No. of Producers	Mold- ing Sand	Build- ing Sand	Engine Sand	Other Sand	Gravel	Total
Black Hawk	8	\$ *	\$ 28,100	\$	\$ *	\$	\$ 29,700
Boone	2		*			*	*
Bremer	4		*			720	730
Buena Vista	2		*			*	*
Butler	1		*				*
Carroll	1			*		*	*
Cerro Gordo	3		*	*		36,294	74,969
Cherokee	3		*		*	*	*
Clayton	1				*		*
Clinton	5		*	*	*	14,723	19,253
Des Moines	3		*	*	*	*	21,515
Dickinson	2					*	*
Dubuque	3		17,470			*	31,144
Emmet	1					*	*
Fayette	3		*		*	*	17,901
Floyd	1				*		*
Franklin	7		1,115			77	1,192
Hardin	4					*	*
Howard	1		*				*
Ida	1				*		*
Jackson	1				*	*	*
Johnson	4		*			*	*
Jones	2			*			*
Kossuth	1		*				*
Lee	1		*				*
Linn	5		*			20,244	36,232
Lyon	4		*		*	*	*
Marion	3		*		*	*	25,413
Muscatine	3		*		*	20,353	53,753
O'Brien	4		1,562		*	*	2,886
Osceola	2		*		*		*
Palo Alto	3				*	*	14,278
Plymouth	6		13,740			*	14,240
Polk	16	*	67,965	*	142,755	37,579	251,019
Sac	3		*	*	*	*	*
Scott	3		*		*	*	*
Sioux	5		21,500	*	*	*	31,900
Story	5		*		*	2,265	5,845
Van Buren	1		*				*
Wapello	3	*	26,274	*	*	*	38,729
Webster	3		*		*		9,121
Winnebago	1				*		*
Winneshiek	3		*		*	*	*
Woodbury	2		*			*	*
Wright	3				*	*	3,271
Counties with less than three producers		3,080	210,354	5,296	131,762	177,044	297,181
Total		3,080	388,080	5,296	274,517	309,299	980,272

*Included with "Counties with less than three producers."

GYPSUM.

In 1916 the value of gypsum produced in Iowa was \$1,496,795, a figure which has never been exceeded since gypsum began to be produced in the state. Although New York produces a greater quantity of gypsum yearly than does Iowa, the value of the Iowa product has exceeded each year for some years the value of the output of New York. Iowa, therefore, ranks first in value of production among the states producing gypsum in the United States. Ten years ago the value of gypsum produced in Iowa was only \$573,498, and hence the value of the output is now considerably more than double that of ten years ago. The total production of gypsum in the state comes from Webster county, where the evidence indicates that there is an abundant supply for future needs. In 1916 there were five plants operating in the Webster county gypsum field. These five plants mined 522,293 tons of crude gypsum. More than 60,000 tons were sold in the crude state to Portland Cement mills, as land plaster, etc. Of the amount calcined 279,157 short tons were prepared and sold for hard wall plaster. The remainder was sold as stucco, plaster of Paris, and related products.

There is an important deposit of gypsum at Centerville, but thus far no production has come from this locality. The lack of production has been due to difficulties in handling the large amount of water which enters the shaft a few feet above the gypsum.

The value of the gypsum produced in Iowa during each of the past ten years is as follows:

PRODUCTION OF GYPSUM IN IOWA FROM 1907 TO 1916 INCLUSIVE.

Year	Value
1907	\$ 730,383
1908	564,688
1909	655,602
1910	943,849
1911	871,752
1912	845,628
1913	1,157,939
1914	1,321,457
1915	1,278,128
1916	1,496,795

The principal items of production and distribution in 1916 and in 1915 for comparison are as follows:

	1915		1916	
	Short Tons	Value	Short Tons	Value
Crude gypsum mined.....	495,860	-----	522,293	-----
Distributed as follows:				
Sold crude--				
To Portland cement mills, as land plaster, etc.....	71,909	\$ 59,930	60,846	\$ 59,297
Sold calcined--				
As wall plaster.....	256,063	1,057,546	279,157	1,210,640
As stucco, plaster of Paris, etc.....	78,994	160,652	56,477	163,881
For other purposes.....	-----	-----	37,782	62,977
Total sold calcined.....	335,057	\$1,218,198	373,416	\$1,437,498
Total sold.....	406,966	\$1,278,128	434,262	\$1,496,795

LEAD AND ZINC.

In 1916 there were no mines operated in the Dubuque district of the Upper Mississippi Valley region. However, about 85 tons of sphalerite concentrates and 20 tons of galena were obtained from the treatment of old dumps and tailings. The estimated metal content of the ore shipped was 14 tons of lead, valued at \$1,938, and 31 tons of recoverable zinc, valued at \$5,628.

MINERAL WATERS.

The value of mineral waters sold in Iowa in 1916 was \$14,404; in 1915 the value of the output was \$18,534. There were seven commercial springs in 1916, whereas, in 1915 there were eight. From the seven springs 148,732 gallons were sold for medicinal and table uses, and 186,031 gallons were sold for soft drinks. The average price per gallon was ten cents. The seven springs reporting sales are as follows:

- Colfax Mineral Spring, Colfax, Jasper county.
- Colfax Grand Spring, Colfax, Jasper county.
- Egralharve Spring, Montgomery, Dickinson county.
- Hawkeye Hygeia Spring, Sioux City, Woodbury county.

Hestons Spring, Fairfield, Jefferson county.
 Red Mineral Springs, Eddyville, Wapello county.
 White Sulphur Spring, Linwood, Scott county.

PORTLAND CEMENT.

In 1916 the three cement plants in Iowa, two of which are at Mason City, the third at Des Moines, produced cement to the value of \$5,063,647, which is the record figure for the state. A fourth plant, located at Gilmore City, Pocahontas county, will soon begin to operate. The figures for the quantity and value of Portland cement shipped by the ten leading states in 1916 are as follows:

SHIPMENT OF PORTLAND CEMENT BY STATES, 1916¹.

State	Shipping Plants	Quantity (barrels)	Value	Average price per Barrel
Pennsylvania.....	20	28,748,546	\$27,915,298	\$.971
Indiana.....	5	10,350,105	11,487,893	1.110
Missouri.....	5	5,732,001	6,333,567	1.105
New York.....	9	5,603,477	5,752,809	1.027
California.....	9	5,216,324	7,407,290	1.420
Michigan.....	11	5,151,818	6,017,911	1.168
Iowa.....	3	4,853,789	6,165,547	1.270
Kansas.....	3	4,293,097	4,613,609	1.073
Illinois.....	4	3,562,659	3,386,431	.951
New Jersey.....	3	2,592,302	2,534,623	.978
Total (ten states).....	77	76,109,118	\$81,614,978	-----
Total (other states).....	36	18,443,178	22,643,238	-----

¹Advance Chapter from Mineral Resources of the United States for 1916.

NATURAL GAS.

The production of natural gas in 1916 came from three shallow wells in Louisa county. The quantity of gas produced was 275,000 cubic feet, with an estimated value of \$275. The gas is obtained from sand pockets in the glacial deposits and is used for lighting dwellings. In many places in Iowa small amounts of gas have been found having the same relations to the drift deposits as has the gas of Louisa county. Recently there has been considerable activity shown by the Interstate Oil Company in Guthrie county near Herndon, a locality which attracted con-

siderable attention in former years. Several leases have been acquired, but there has been no important development.

Gas in commercial quantities has not yet been found in any of the wells that have been drilled for water in the indurated rocks of the state.

IRON ORE.

In 1916 the Missouri Iron Company began to ship ore from Iron Hill, which is about two and one-half miles northeast of the town of Waukon in Allamakee county. The general characters of this most interesting ore body, the composition of the ore, the method of treatment, and other features, are described fully in volume XXV, pages 33 to 92, of the Reports of the Iowa Geological Survey.