MINES AND QUARRIES BY STATES AND TERRITORIES

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INTRODUCTORY STATEMENT.

At the census of 1870, when the statistics of mining were first presented separately, they were summarized to show the totals in each state for each mineral and for all minerals. This practice was not followed at the censuses of 1880 and 1890, and comparable data are available for only a few states and the principal minerals. The great diversity of minerals now produced, and the great and increasing importance of the mineral industry in many states, make a summarization of this character again desirable. The detailed statistics for all productive mines in each state and territory, irrespective of the character of the ore, are shown in Table 2, and for the active but nonproductive mines, in Table 14, on page 57.

In the following discussion of the statistics for mines, quarries, and natural-gas and petroleum wells for each state, the states and territories are considered in alphabetical order. For each state a table is first presented, which shows the principal items for each of the leading minerals, and for all other minerals produced in commercial quantities during 1902. This table is followed by a general description of the state's mineral resources, and a summary of the statistics for the active but nonproductive mines. A brief résumé is also given of the products of manufactures that are closely allied to, or based on, the mining industry, because of the use of the products of mines as raw materials. The value of the production of the leading minerals is shown for a series of years, and the nature, occurrence, and history of each is discussed, together with a statement of the relative importance of the state in its production.

VIRGINIA.

Table 1 is a summary of the statistics for the productive mines and quarries in the state of Virginia for 1902.

TABLE 1.—SUMMARY: 1902.

	Total.	Coal, bituminous.	Iron ore.	Limestones and dolomites.	Sulphur and pyrite.	Cement.	Siliceous crystalline rocks.	Slate.	Manganese ore.	All other minerals.[1]
Number of mines or quarries	192	26	62	37	6	3	17	4	6	31
Number of operators	140	22	25	28	4	3	17	4	6	31
Salaried officials, clerks, etc.:										
Number	700	179	257	63	32	48	21	15	10	80
Salaries	$546,204	$155,930	$174,034	$35,459	$20,970	$44,675	$12,904	$11,490	$4,241	$77,501
Wage-earners:										
Average number	8,993	3,004	2,686	890	655	178	469	247	113	751
Wages	$3,458,450	$1,407,867	$888,958	$290,979	$222,986	$83,423	$190,322	$97,645	$33,903	$242,367
Contract work	$35,964	$27,600	$6,730		$1,134					$500
Miscellaneous expenses	$603,290	$315,384	$120,663	$24,898	$23,285	$31,487	$12,466	$24,366	$600	$50,241
Cost of supplies and materials	$928,387	$215,458	$201,426	$126,956	$137,491	$91,100	$22,290	$20,964	$8,691	$104,011
Value of product	$6,607,807	$2,543,595	$1,652,799	$535,113	$501,642	$327,659	$282,046	$160,951	$29,444	$574,558

[1] Includes operators as follows: Asbestos, 1; barytes, 3 (4 mines); buhrstones and millstones, 3; copper ore, 1; flint, 1; gold and silver, 5; gypsum, 2; infusorial earth, tripoli, and pumice, 2; lead and zinc ore (2 mines—operator reported under iron ore); marl, 1; mica, 2; mineral pigments, crude, 2; precious stones, 3 (no mines); rutile, 1; sandstones and quartzites, 2; talc and soapstone, 2.

The range of mineral industry in Virginia in 1902 was wide and varied, comprising within its scope the production on a commercial scale of twenty-four different minerals. First among these in point of value was the production of bituminous coal, obtained in the main from the vast deposits of high-grade steam and coking coal in the southwestern part of the state. It is this region that furnishes the celebrated Pocahontas coal. Iron ore, which was extensively produced in 1902, occurs among the mountains in deposits of remarkable richness, the beds of ore being from 20 to 100 feet in thickness and many miles long. For 300 miles the western foothills of the Blue Ridge are lined with brown hematite ore and solid masses of it appear along the Alleghenies.[1] The yield of brown hematite from this region comprises an important percentage of the total output of this variety in the country, and also constitutes the bulk of iron ore production in the state.

The industry of manganese ore mining had its beginning in Virginia, and more than one-half of the total output of this mineral in the United States has been contributed by the mines of this state, during the third of a century of manganese ore exploitation in the country.

The lead and zinc deposits of Wythe county have been worked for more than a hundred and twenty-five years, and furnished lead to both the Continental and Confederate Armies.[2]

The great gold belt, 200 miles in length, which stretches from the Potomac to the Dan, has furnished more than $2,000,000 worth of gold to the Mint.[3]

The copper deposits of the state are extensive, especially in southwestern Virginia,[3] and the noted deposits of Louisa county have long been the seat of an important industry.[4]

The sandstones of the Blue Ridge, the limestones and slates of the valleys, and the granites which are widely distributed afford an abundant supply of building materials, and their exploitation constitutes an important industry in the state.[4]

From the fertilizing marls and greensands of Tidewater westward to the vast coal and metalliferous deposits near the Kentucky and West Virginia lines is spread a great variety of mineral wealth, which affords such basis as to make the mining industry an important factor in the industrial activity of the state.

The following is a list of minerals of known occurrence in Virginia which were not produced commercially in 1902: Allanite, alum, arsenic, bismuth, carbonite, feldspar, fire clay, kaolin, marble, plumbago, quartz, serpentine, and tin.

Work of a developing character, where no production was realized from the mining properties, was reported by 5 operators, and was confined during 1902 to gold and silver and manganese ore. These operators

[1] King's Handbook of the United States, page 858.
[2] Transactions of the American Institute of Mining Engineers, Vol. V, page 85.
[3] Transactions of the American Institute of Mining Engineers, Vol. V, page 81 ff.
[4] The New International Encyclopedia, Vol. XVII, page 374.

paid $4,535 to 8 salaried officials, clerks, etc., during 1902, and gave employment to an average number of 51 wage-earners who received $17,964 in wages. Contract work amounted to $158, miscellaneous expenses to $9,752, and the cost of supplies and materials to $26,305.

The relative importance of manufacturing industries closely allied to or based upon the mining industry, using as their raw material the products of mines and quarries, is shown in the following table:

TABLE 2.—*Manufactures based primarily upon the products of mines and quarries: 1900.*

INDUSTRY.	Value of product.	
All manufactures		$132,172,910
Based upon products of mines or quarries:		
Chemicals and allied products	$4,483,348	
Clay, glass, and stone products	2,121,495	
Iron and steel and their products	13,549,769	
Metals and metal products, other than iron and steel	1,698,151	
Miscellaneous industries	5,419,838	
		27,272,601
All other		104,900,309

The total value of the products of the manufacturing industries based upon mining was $27,272,601, or 20.6 per cent of the total value of the product of all manufacturing industries in the state in 1900. During the same year there were employed in all branches of manufacture in the state 72,702 wage-earners, who were paid $22,445,720 in wages. In 1902 there were employed in the mines and quarries of the state 8,993 wage-earners, who received $3,458,450 in wages. Comparing the figures for these two branches of industry, it will be seen that 89 per cent of the wage-earners, receiving 86.6 per cent of the wages, were employed in manufacturing, while 11 per cent of the wage-earners, receiving 13.4 per cent of the wages, were employed in mining.

The following table, compiled from the reports of the United States Geological Survey, shows the value of the annual production of the principal minerals of the state from 1890 to 1902:

TABLE 3.—*Value of annual production of principal minerals: 1890 to 1902.*

[United States Geological Survey, "Mineral Resources of the United States."]

YEAR.	Coal, bituminous.	Iron ore.	Limestones and dolomites.	Cement.	Siliceous crystalline rocks.	Slate.	Manganese ore.
1890	$589,925	(1)	$159,023	[2]$45,000	$332,548	$113,079	$125,121
1891	611,654	(1)	170,000	18,000	300,000	127,819	180,533
1892	678,429	[2]$1,428,801	185,000	10,000	300,000	150,000	58,066
1893	692,748	[2]1,050,977	82,685	15,084	103,703	117,347	30,802
1894	933,576	[2]873,305	284,547	8,700	123,361	138,151	16,658
1895	869,873	987,077	268,892	7,830	70,426	111,357	15,656
1896	848,851	1,220,619	182,640	10,566	95,040	107,863	21,485
1897	1,021,918	974,031	192,972	9,139	88,096	145,370	33,630
1898	1,070,417	1,226,290	182,852	5,301	136,180	150,946	55,938
1899	1,304,241	[2]1,766,410	255,640	38,100	223,380	183,110	53,069
1900	2,123,222	[2]1,489,318	403,318	88,286	211,080	190,211	69,924
1901	2,358,989	[2]1,466,423	539,128	(3)	275,701	178,979	52,853
1902[4]	2,548,595	1,652,799	535,113	327,659	282,046	160,951	29,444

[1] Not reported separately.
[2] Includes production from West Virginia.
[3] Reported with the production for Ohio.
[4] Census figures.

Coal.—The mining of coal in Virginia, and in the United States, began in 1775, near Richmond; its occurrence in this locality, however, had been noted some five years earlier.[1] From the beginning of the industry of coal mining until 1789 the entire output went to supply the local demand. During 1789 the product of the mines began to find a wider market in the northern cities, and for many years the bituminous coal deposits of the Richmond basin were the only source from which this mineral could be procured and shipped coastwise.[2] The product sent out in this way to other cities had grown in 1822 to 48,000 tons and in 1833 to 143,000 tons.[2] About this time the discovery and development of other coal areas carrying deposits of superior quality and more economical of exploitation caused a rapid decline in the output of this region. By the middle of the century the production of coal in this field had practically ceased. For more than a quarter of a century the output of coal in the state was insignificant, but the building of the Norfolk and Western Railway, in 1883, was followed by the development of the great coal deposits of southwestern Virginia, notably the Pocahontas region, and the state soon came again into prominence as a coal producer. In 1880 the total coal production of the state was only 112,000 short tons, but in 1889, or seven years after operations in the new fields were under way, the output had increased to 865,786 short tons, and in 1902 had reached a total of 3,182,993 short tons.

The following table, compiled from the reports of the United States Geological Survey, shows the annual production of coal in the state from 1822 to 1902:

TABLE 4.—*Annual production of coal, bituminous: 1822 to 1902.*

[United States Geological Survey, "Mineral Resources of the United States."]

YEAR.	Short tons.	YEAR.	Short tons.	YEAR.	Short tons.
1822	54,000	1849	15,000	1876	85,000
1823	60,000	1850	10,000	1877	90,000
1824	67,040	1851	10,000	1878	96,000
1825	75,000	1852	25,000	1879	105,000
1826	88,720	1853	50,000	1880	112,000
1827	94,000	1854	70,000	1881	112,000
1828	100,080	1855	80,782	1882	112,000
1829	100,000	1856	52,687	1883	252,000
1830	102,800	1857	63,605	1884	336,000
1831	118,000	1858	77,690	1885	507,000
1832	132,000	1859	59,055	1886	684,951
1833	125,000	1860	64,759	1887	826,263
1834	124,000	1861	45,165	1888	1,073,000
1835	120,000	1862	45,124	1889	865,786
1836	124,000	1863	40,000	1890	784,011
1837	110,000	1864	40,000	1891	786,399
1838	107,999	1865	40,000	1892	675,205
1839	96,000	1866	40,000	1893	820,339
1840	88,000	1867	50,000	1894	1,229,083
1841	79,600	1868	59,051	1895	1,368,824
1842	73,640	1869	65,000	1896	1,254,723
1843	70,000	1870	69,219	1897	1,528,302
1844	65,000	1871	70,000	1898	1,815,274
1845	50,000	1872	69,440	1899	2,105,791
1846	40,000	1873	67,200	1900	2,393,754
1847	25,000	1874	70,000	1901	2,725,873
1848	18,000	1875	80,000	1902	3,182,993

The coal deposits of the state occur in two distinct areas. The first of these, that in which the industry

[1] United States Geological Survey, Twenty-second Annual Report, Part III, page 38.
[2] Statistics of Coal, by R. C. Taylor, page 21.

of coal mining in the country had its inception, comprises the counties of Henrico, Chesterfield, and Goochland, and parts of Powhatan and Amelia; the second, and by far the more important field of the state, is a part of the great Appalachian region and lies in the southwestern part of the state.[1] Perhaps the most remarkable and valuable occurrence of bituminous coal to be found in the United States in association with vast deposits of metalliferous ores is that forming the southeastern portion of the Kanawha basin and comprising Tazewell, Russell, Scott, Buchanan, Wise, and Lee counties.[2]

Iron ore.—Probably the first iron ore mining in the New World occurred in Virginia, for on April 10, 1608, a ship belonging to the Virginia Company of London sailed from Jamestown loaded with iron ore and other commodities, reaching England on May 20. The record of this first exploitation of American ore by Europeans states that this ore was smelted and 17 tons of metal were sold at £4 per ton.[3]

For several years following numerous attempts were made by the Virginia Company to establish the industry of iron manufacture in the vicinity of Falling creek. Under the direction of John Berkley, who was sent out by the company in 1621, the construction of several plants for the reduction of the ore was begun. However, just when these works were nearing completion and the prospects for a rapid development of the industry were bright, the colony was massacred by the Indians, on March 22, 1622. There is no record of further efforts to manufacture iron in the colony for many years. In 1687 and again in 1696 Col. William Byrd set on foot a plan to rebuild these works, but the project never materialized.[4]

In the eighteenth century, however, the colony became very prominent in the manufacture of iron and fulfilled in an eminent degree, though at a much later day, the expectations which had been entertained of its iron producing capabilities by the enterprising but unfortunate Virginia Company of London.[4]

To Col. Alexander Spotswood, who was governor of the colony from 1710 to 1723, has been accredited the honor of establishing the iron industry of the state on a firm and permanent basis. During this period a colony of German Protestants settled at the head of the Rappahannock river, with the hope of locating mines. It is probable that the first furnace in the state was owned by Governor Spotswood and was built and operated in 1715 or 1716 by these German miners, who were in his employ.[5]

The industry of iron making, the growth of which was stimulated by encouragement from the colonial government, spread rapidly into other localities and at the beginning of the Revolution was an important factor in the industrial development of the colony.[6]

In common with other industries, iron making took a fresh start subsequent to the War of the Revolution and for many years no state in the Union gave closer attention to domestic manufactures than Virginia. As the result of various causes, however, the iron industry in Virginia declined rapidly toward the middle of the nineteenth century and by 1856 many of the furnaces and forges had been abandoned.[6]

A new era of activity in iron working in Virginia opened, however, with the discovery of vast deposits of high-grade ore in the southwestern part of the state. This was followed by extension of railroads into the region and the exploitation of the celebrated coal deposits of the Pocahontas Flat Top district, and has resulted in a reawakening in the industry that has again brought the state into prominence as an iron producer.[7]

The following table, compiled from the reports of the United States Geological Survey, shows the annual production of iron ore in the state from 1890 to 1902:

TABLE 5.—*Annual production of iron ore: 1890 to 1902.*

[United States Geological Survey, "Mineral Resources of the United States."]

YEAR.	Long tons.	YEAR.	Long tons.
1890	543,583	1897	711,128
1891	668,916	1898	557,713
1892	741,027	1899	[1] 986,470
1893	[1] 616,965	1900	[1] 921,821
1894	[1] 600,562	1901	[1] 926,394
1895	712,241	1902	[1] 987,958
1896	859,466		

[1] Includes production from West Virginia.

Limestones and dolomites.—The predominating rocks of the region west of the Blue Ridge are the limestones. This region has long been famous for the occurrence of natural curiosities in the limestone formations, such as Weyers cave, in Augusta county, the caves of Luray, in Page county, and the Natural Bridge, the arched remnant of a cave, in Rockbridge county.[8]

The limestones have been quarried extensively at numerous places, but have been used to only a very limited extent for building purposes, the bulk of the output being utilized for making lime and as a flux in the reduction of ores.

Sulphur and pyrite.—The extensive pyrite deposits of the state, and especially those of Louisa county, where practically inexhaustible quantities occur, have long been exploited. The bulk of the product of these mines has gone into the manufacture of sulphuric acid, the demand for which commodity has increased materially during the last decade, as a result of its extended use in the manufacture of paper from wood pulp and in the manu-

[1] Coal Statistics, published by Alder & Ruley, 1902, page 164.
[2] Transactions of the American Institute of Mining Engineers, Vol. VIII, page 343.
[3] Iron in All Ages, by James M. Swank, page 103.
[4] Ibid., pages 103 to 107.
[5] Ibid., pages 258 and 259.
[6] Iron in All Ages, pages 261 to 269.
[7] Ibid., pages 269 to 271.
[8] The New International Encyclopedia, Vol. XVII, page 374.

facture of superphosphates from phosphate rock, in which latter process a chemically pure sulphuric acid is not essential and that made from pyrite serves the purpose equally as well as that made from sulphur.[1]

In the production of pyrite, the importance of which is rapidly increasing, Virginia took first rank in 1902, with an output valued at $501,642, or 64.7 per cent of the total yield of this mineral in the United States.

Cement.—The industry of the manufacture of cement from natural rock in Virginia dates from 1835 and had its beginning in Rockbridge county. The quality of this first product was excellent. Works were established at Balcony Falls in 1848; subsequently this plant was destroyed by flood and later was rebuilt on a more extended scale at Locker, a short distance away, where it is at present in operation and enjoys the distinction of being the oldest active cement plant in the state. Another large and important cement plant is located near Staunton, at Craigsville. It was built in 1900, and in 1902 contributed an important percentage of high-grade cement to the total output of this mineral in the state.[2]

Table 6, compiled from the reports of the United States Geological Survey, shows the annual production of cement from 1890 to 1902.

TABLE 6.—*Annual production of cement: 1890 to 1902.*

[United States Geological Survey, "Mineral Resources of the United States."]

YEAR.	Barrels.	YEAR.	Barrels.
1890	[1] 50,000	1897	15,232
1891	20,000	1898	8,835
1892	10,000	1899	68,500
1893	17,509	1900	83,792
1894	14,500	1901	[2]
1895	13,050	1902	368,869
1896	16,776		

[1] Includes production from West Virginia.
[2] Included in the production of Ohio.

Siliceous crystalline rocks.—The production of building stone has long been an important industry in the state, and the output of the Virginia granite quarries has been used in many notable structures. Among these is the State, War, and Navy Department building at Washington.[3]

The siliceous crystalline rocks of the state are confined in the main to a belt or zone running from Alexandria county through Fairfax, Fauquier, Spottsylvania, Henrico, Goochland, Chesterfield, Dinwiddie, and Greenesville counties, into North Carolina. While a wide area of occurrence is comprised within this belt, the outcrops of quarriable granite are confined to a very limited part of this region, the principal points being in Chesterfield and Dinwiddie counties, on the James river, and in the immediate vicinity of Richmond.

The product of the quarries in the vicinity of Richmond and of those in Chesterfield county is a massive gray granite, well adapted for general building purposes, paving stone, and monumental work. This granite has found a market in practically all the states and cities south of New England and as far west as Nebraska.[3]

Slate.—The occurrences of slate in deposits of commercial importance are distributed over a considerable area in Virginia and have been exploited in numerous places. The principal producing district in 1902, and that within which the industry of slate quarrying in the state most probably had its origin, was in Buckingham county.[4] Smaller products were also reported from Amherst and Albemarle counties. Abundant deposits of this mineral have been found and developed to a limited extent in the Great Valley and Appalachian districts.[5]

Manganese ore.—The beginning of manganese ore mining in Virginia, and perhaps in the United States, occurred in 1857 in the Shenandoah valley, about 100 tons being taken out during that year. In 1868 and 1869 about 5,000 tons of manganese ore were taken out near Warminster, and this marks the beginning of systematic manganese ore mining in the state.[6]

For many years the states of Virginia and Georgia have contributed the bulk of the output of this valuable mineral in the United States, nearly all the yield being exported to England. The period of greatest activity in manganese mining in the state was that beginning in 1885 and closing with 1891, during which years the average annual production was about 15,000 tons, the maximum output occurring in 1886, when the total was 20,567 long tons. There has been a marked decline in the state's production in recent years.

Table 7, compiled from reports of the United States Geological Survey, shows the annual production of manganese ore in the state from 1880 to 1902, inclusive, during which period the state contributed more than 55 per cent of the total output of this mineral in the country.

TABLE 7.—*Annual production of manganese ore: 1880 to 1902.*

[United States Geological Survey, "Mineral Resources of the United States."]

YEAR.	Long tons.	YEAR.	Long tons.
Total	191,067	1891	16,218
		1892	6,079
1880	3,661	1893	4,092
1881	3,295	1894	1,797
1882	2,982	1895	1,715
1883	5,355	1896	2,018
1884	8,980	1897	3,650
1885	18,745	1898	5,662
1886	20,567	1899	6,228
1887	19,835	1900	7,881
1888	17,646	1901	4,275
1889	14,616	1902	3,041
1890	12,699		

[1] United States Geological Survey, "Mineral Resources of the United States," 1902, page 941.
[2] Ibid., page 808.
[3] Stones for Building and Decoration, by George P. Merrill, pages 85 and 86.
[4] United States Geological Survey, "Mineral Resources of the United States," 1882, page 742.
[5] The Universal Cyclopedia, Vol. 12, page 211.
[6] United States Geological Survey, "Mineral Resources of the United States," 1892, page 202 ff.

The known occurrences of manganese ore in the state are widely distributed, being practically coextensive with its area. Beginning with the pocket occurrences in the eastern part or Tidewater district, manganese ore has been found and mined in the Midland, Piedmont, Blue Ridge, Valley, Appalachia, and trans-Appalachia divisions westward to the West Virginia line. The great bulk of the state's output, however, has come from the Valley region.[1]

All other minerals.—Asbestos, which occurs in numerous places in western and southwestern Virginia,[2] was mined to a limited extent during the year. Barytes of good quality and in large quantities occurs at many points in the southern and southwestern parts of the state, notably in Campbell county in the vicinity of Lynchburg,[3] and its mining has for many years been of relative importance. The output of this mineral in Virginia in 1902 comprised more than one-fifth of the total production in the country.

Buhrstones and millstones were obtained from granitic rocks at several places in the state, the production for 1902 constituting nearly 20 per cent of the total value of production of the United States.

Copper ores occur extensively in southwestern Virginia and in some other sections of the state, especially in Louisa county near Talersville.[4] Copper was produced on a commercial scale in 1902 at only one mine.

Virginia became a producer of flint in 1902, though the output was small and was confined to one mine.

Gold and silver in a limited way has been a mineral product of the state for more than a century and a quarter. The first recorded discovery of gold in the state was that noted in the papers of Thomas Jefferson. About 4 miles below the falls on the Rappahannock river there was found a lump of ore weighing 4 pounds; this yielded, when treated, 17 pennyweights of gold.[5] Gold is of wide occurrence in the state, and extensive mining operations have been prosecuted at different times over a wide area. The principal deposits occur within the Virginia gold belt, which extends from the Potomac river to Halifax county, a distance of about 200 miles, with a width varying from 15 to 25 miles.[6]

Gypsum, the producing localities of which are the Holston river fields around Saltville, was mined in 1902 to a limited extent at two points, though in former years large quantities of this mineral were taken out.[7]

An extensive bed of infusorial earth is traceable from the Patuxent river in Maryland to the Meherrin in Virginia. Exposed patches occur at Richmond and other points.[8] The output in 1902 was limited to the production of two concerns.

A small quantity of lead ore was produced in 1902 at two mines, the work being carried on in connection with the mining of iron ore. Extensive deposits of lead ore occur in southwestern Virginia, and lead mining was begun in this region more than a century ago.[9]

The marls which occur in the eastern part of the state were mined to a limited extent during the year, one establishment reporting production. Virginia and New Jersey mined the entire production of marl in the United States in 1902.

Mica occurs in numerous places, notably in Hanover, Goochland, Bedford, Henry, and Amelia counties.[5] The production in 1902 was from two mines.

Mineral paints were produced to a limited extent during the year in Bedford and Page counties.

While no mining operations were prosecuted for precious stones, specimens of value were picked up in a number of places.

Deposits of rutile occur on both sides of the Tye river near Roseland post office, in Nelson county, and the production of this mineral during the year was confined to the output of one company operating in this vicinity.

Sandstones and quartzites were quarried during the year on a commercial scale at two points. The occurrence of these rocks in the state is extensive.[9]

Numerous occurrences of soapstone have been noted in the state, notably in the southern and southwestern parts. In Campbell county there is a continuous belt traceable for miles.[10] The product of the state in 1902 was reported from two mines.

[1] United States Geological Survey, "Mineral Resources of the United States," 1892, page 202 ff.
[2] Ibid., 1882, page 738.
[3] Ibid., page 741.
[4] Ibid., 1887, page 799.
[5] Ibid., Sixteenth Annual Report, 1894–95, Part III, page 256.
[6] United States Geological Survey, "Mineral Resources of the United States," 1887, page 800.
[7] King's Handbook of the United States, page 858.
[8] United States Geological Survey, "Mineral Resources of the United States," 1887, page 803.
[9] The New International Encyclopedia, Vol. XVII, page 374.
[10] United States Geological Survey, "Mineral Resources of the United States," 1887, page 802.