

# MINING AND QUARRYING TRENDS

By Jean K. Moore

The mining and quarrying trends shown in this report were calculated from data reported to the U.S. Geological Survey (USGS) by nonfuel mining and quarrying companies operating in the United States. The data for 1997 were reported on the Mine, Development, and Mineral Exploration Supplement, a statistical survey conducted by the USGS. Additional data for 1997 were derived from 58 annual USGS production and consumption surveys of minerals producers. These surveys covered 59 nonfuel mineral commodities produced in the United States.

Mining and quarrying data for 1997, as shown in this report, include the annual data for the construction sand and gravel commodities and for the crushed and dimension stone commodities. From 1981 to 1994, these mineral commodities were surveyed biennially and appeared alternately in this report. The inclusion of both sets of data in this report results in essentially a complete coverage of nonfuel mineral production in the United States. However, this does not make comparisons of 1994-97 data with previously reported annual data possible.

Total domestic mining of nonfuel mineral materials amounted to 6 billion metric tons in 1997, a 4% increase above that of 1996. These materials included 3.9 billion tons of crude ore mined or quarried and 2.1 billion tons of mine waste and ore from development. Of the nonfuel mineral materials mined, 51% was

for the production of industrial minerals and 49% was for the production of metals. Overall, 97% of nonfuel mineral mining and quarrying was performed at surface levels and the remaining 3% was underground.

Total surface mining and quarrying for industrial minerals amounted to 2.9 billion tons, about the same level as that of 1996. Crude ore mined at these surface operations was 2.5 billion tons, and the remaining 407 million tons was waste and ore from development. Underground mining for industrial minerals amounted to only 112 million tons, of which nearly all was crude ore.

Total surface mining for metal ores came to 2.9 billion tons, a 5% increase compared with that of 1996. Of the 2.9 billion tons, about 1.2 billion tons was crude ore mined and the remaining 1.7 billion tons was waste and ore from development. Underground mining of metal ores was small, amounting to only 61 million tons, of which 95% was crude ore.

The major States in which mining for nonfuel minerals took place were, in order of total material handled, Nevada, Arizona, Florida, Minnesota, California, New Mexico, Michigan, Utah, Texas, and Ohio. These 10 States accounted for nearly 70% of the mining conducted in the United States. Virtually all of the mining in these States was surface mining.

TABLE 1  
MATERIAL HANDLED AT SURFACE AND UNDERGROUND MINES IN THE UNITED STATES, BY TYPE 1/

(Million metric tons)

Type and year	Surface 2/			Underground 3/			All mines		
	Crude ore	Waste 4/	Total	Crude ore	Waste 4/	Total	Crude ore	Waste 4/	Total
<b>Metals:</b>									
1993	921	1,140	2,060	34	2	36	955	1,140	2,100
1994	900 r/	1,530 r/	2,430 r/	37	1	38	937 r/	1,530 r/	2,460
1995	922	1,580 r/	2,500 r/	53	2	55	975	1,580 r/	2,560 r/
1996	1,160 r/	1,570 r/	2,730 r/	48	3	51	1,210 r/	1,580 r/	2,780 r/
1997	1,170	1,690	2,870	58	3	61	1,230	1,700	2,930
<b>Industrial minerals:</b>									
1993 5/	1,180	310	1,490	101	(6/)	101	1,280	311	1,590
1994	2,270	425	2,690	104	(6/)	104	2,370	425	2,800
1995	2,350	455	2,800	104	3	106	2,450	458	2,910
1996	2,430	434	2,860	108	3	111	2,540 r/	437	2,970
1997	2,520	407	2,930	112	(6/)	112	2,630	407	3,040
<b>All mineral commodities:</b>									
1993	2,100	1,450	3,550	135	2	137	2,230	1,450	3,680
1994	3,170	1,950	5,120	141	1	142	3,310	1,950	5,260
1995	3,270	2,030 r/	5,300 r/	156	5	161	3,420	2,040 r/	5,460 r/
1996	3,590 r/	2,010 r/	5,590 r/	157	6	162	3,740 r/	2,010 r/	5,750 r/
1997	3,690	2,100	5,790	169	4	173	3,860	2,100	5,960

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes materials from wells, ponds, and pumping operations.

3/ Includes solution mining.

4/ Includes ore and waste from development operations.

5/ Construction sand and gravel data were not available because of biennial canvassing.

6/ Less than 1/2 unit.

TABLE 2  
MATERIAL HANDLED AT SURFACE AND UNDERGROUND MINES IN THE UNITED STATES IN 1997,  
BY COMMODITY AND STATE 1/

(Thousand metric tons)

	Surface 2/			Underground 3/			All mines		
	Crude ore	Waste 4/	Total	Crude ore	Waste 4/	Total	Crude ore	Waste 4/	Total
<b>Metal ores:</b>									
Copper	674,000	636,000	1,310,000	W	W	W	674,000 5/	636,000 5/	1,310,000
Gold	257,000	840,000	1,100,000	5,460	1,330	6,790	263,000	841,000	1,100,000
Iron	210,000	179,000	388,000	W	--	W	210,000 5/	179,000	388,000
Molybdenum	7,720	10,000	17,800	W	W	W	7,720 5/	10,000 5/	17,800
Silver	1,280	1,290	2,570	W	W	W	1,280 5/	1,290 5/	2,570
Zinc	W	W	W	5,400	997	6,390	5,400 6/	997 6/	6,390
Other 7/	22,000	28,300	50,300	46,700	751	47,500	68,700	29,100	97,800
Total	1,170,000	1,690,000	2,870,000	57,600	3,080	60,600	1,230,000	1,700,000	2,930,000
<b>Industrial minerals:</b>									
Barite	1,270	W	1,270 8/	--	--	--	1,270	W	1,270
Clays	40,800	35,400	76,200	W	W	W	40,800 5/	35,400 5/	76,200
Diatomite	1,660	W	1,660 8/	--	--	--	1,660	W	1,660
Feldspar 9/	736	W	736 8/	--	--	--	736	W	736
Garnet	61	--	61	--	--	--	61	--	61
Gypsum	16,000	5,360	21,300	2,660	--	2,660	18,600	5,360	24,000
Mica (scrap)	251	W	251 8/	--	--	--	251	W	251
Phosphate rock	163,000	W	163,000 8/	--	--	--	163,000	W	163,000
Pumice 10/	577	64	641	--	--	--	577	64	641
Salt	5,020	--	5,020	31,000	W	31,000 8/	36,000	W	36,000
<b>Sand and gravel:</b>									
Construction	927,000	W	927,000 8/	W	--	W	927,000	W	927,000
Industrial	26,100	30	26,200	--	--	--	26,100	30	26,200
Soda ash	W	--	W	10,800	--	10,800	10,800 6/	--	10,800
<b>Stone:</b>									
Crushed	1,320,000	106,000	1,430,000	51,900	364	52,300	1,370,000	107,000	1,480,000
Dimension	1,100	558	1,660	39	--	39	1,140	558	1,700
Talc and pyrophyllite	850	W	850 8/	W	W	W	850	W	850
Tripoli	89	--	89	--	--	--	89	--	89
Other 11/	15,300	259,000	274,000	15,200	53	15,200	30,500	259,000	290,000
Total	2,520,000	407,000	2,930,000	112,000	416	112,000	2,630,000	407,000	3,040,000
Grand total	3,690,000	2,100,000	5,790,000	169,000	3,500	173,000	3,860,000	2,100,000	5,960,000
<b>States:</b>									
Alabama	57,500	5,910	63,400	W	W	W	57,500 5/	5,910 5/	63,400
Alaska	34,300	20,700	55,100	W	W	W	34,300 5/	20,700 5/	55,100
Arizona	521,000	W	521,000 8/	W	W	W	521,000 5/	W	521,000
Arkansas	40,700	6,700	47,400	--	--	--	40,700	6,700	47,400
California	211,000	69,900	281,000	W	W	W	211,000 5/	69,900 5/	281,000
Colorado	51,100	15,100	66,200	W	W	W	51,100 5/	15,100 5/	66,200
Connecticut	11,100	507	11,600	--	--	--	11,100	507	11,600
Delaware	2,420	--	2,420	--	--	--	2,420	--	2,420
Florida	243,000	W	243,000 8/	317	2	319	243,000	2 6/	243,000
Georgia	83,600	15,200	98,800	W	W	W	83,600 5/	15,200 5/	98,800
Hawaii	5,940	445	6,380	--	--	--	5,940	445	6,380
Idaho	43,200	37,600	80,800	506	W	506 8/	43,700	37,600 5/	81,300
Illinois	96,000	5,010	101,000	4,800	34	4,830	101,000	5,040	106,000
Indiana	76,700	5,270	82,000	4,500	W	4,500 8/	81,200	5,270 5/	86,400
Iowa	42,300	2,560	44,800	6,790	41	6,830	49,100	2,600	51,700
Kansas	33,900	2,220	36,100	3,720	W	3,720 8/	37,600	2,220 5/	39,800
Kentucky	45,100	3,780	48,900	15,800	110	15,900	60,900	3,890	64,800
Louisiana	16,200	667	16,900	15,600	--	15,600	31,800	667	32,500
Maine	8,880	249	9,130	--	--	--	8,880	249	9,130
Maryland	37,500	2,430	39,900	W	W	W	37,500 5/	2,430 5/	39,900
Massachusetts	24,900	1,040	25,900	W	W	W	24,900 5/	1,040 5/	25,900
Michigan	154,000	W	154,000 8/	924	--	924	155,000	W	155,000
Minnesota	216,000	119,000	336,000	--	--	--	216,000	119,000	336,000

See footnotes at end of table.

TABLE 2--Continued  
MATERIAL HANDLED AT SURFACE AND UNDERGROUND MINES IN THE UNITED STATES IN 1997,  
BY COMMODITY AND STATE 1/

(Thousand metric tons)

	Surface 2/			Underground 3/			All mines		
	Crude ore	Waste 4/	Total	Crude ore	Waste 4/	Total	Crude ore	Waste 4/	Total
States--Continued:									
Mississippi	14,300	1,040	15,300	--	--	--	14,300	1,040	15,300
Missouri	74,400	6,440	80,900	12,500	90	12,600	86,900	6,530	93,500
Montana	33,600	44,100	77,700	986	W	986 8/	34,600	44,100 5/	78,700
Nebraska	18,600	562	19,200	W	W	W	18,600 5/	562 5/	19,200
Nevada	217,000	815,000	1,030,000	3,170	W	3,170 8/	220,000	815,000 5/	1,030,000
New Hampshire	10,500	176	10,700	--	--	--	10,500	176	10,700
New Jersey	36,900	1,640	38,500	--	--	--	36,900	1,640	38,500
New Mexico	W	W	W	16,600	W	16,600 8/	16,600 6/	W	16,600
New York	74,300	4,900	79,200	3,820	W	3,820 8/	78,100	4,900 5/	83,000
North Carolina	89,000	10,700	99,700	--	--	--	89,000	10,700	99,700
North Dakota	9,080	49	9,120	--	--	--	9,080	49	9,120
Ohio	122,000	7,880	130,000	2,870	W	2,870 8/	125,000	7,880 5/	133,000
Oklahoma	44,700	3,150	47,900	W	W	W	44,700 5/	3,150 5/	47,900
Oregon	40,500	2,140	42,600	--	--	--	40,500	2,140	42,600
Pennsylvania	102,000	7,560	109,000	3,820	27	3,850	105,000	7,580	113,000
Rhode Island	3,990	145	4,130	--	--	--	3,990	145	4,130
South Carolina	40,800	7,220	48,000	W	--	W	40,800 5/	7,220	48,000
South Dakota	22,500	24,500	47,000	1,230	(12/)	1,230	23,800	24,500	48,200
Tennessee	61,900	5,220	67,100	9,080	W	9,080 8/	70,900	5,220 5/	76,200
Texas	145,000	8,610	154,000	W	W	W	145,000 5/	8,610 5/	154,000
Utah	104,000	W	104,000 8/	W	W	W	104,000 5/	W	104,000
Vermont	11,200	616	11,800	W	--	W	11,200 5/	616	11,800
Virginia	80,600	6,240	86,800	W	W	W	80,600 5/	6,240 5/	86,800
Washington	54,600	1,250	55,800	W	--	W	54,600 5/	1,250	55,800
West Virginia	17,900	1,390	19,300	2,620	13	2,640	20,500	1,400	21,900
Wisconsin	60,900	2,360	63,200	W	--	W	60,900 5/	2,360	63,200
Wyoming	11,800	3,520	15,300	9,710	32	9,750	21,500	3,550	25,100
Undistributed 13/	131,000	821,000	952,000	49,800	3,150	52,900	181,000	824,000	1,000,000
Grand total	3,690,000	2,100,000	5,790,000	169,000	3,500	173,000	3,860,000	2,100,000	5,960,000

W Withheld to avoid disclosing company proprietary data.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes materials from wells, ponds, and pumping operations.

3/ Includes solution mining.

4/ Includes ore and waste from development operations.

5/ Excludes materials from underground operations.

6/ Excludes materials from surface operations.

7/ Includes beryllium, gold-silver, lead, magnesium metal, manganiferous, platinum and palladium, rare-earth metal concentrates, titanium, uranium, and metal items indicated by symbol W.

8/ Excludes waste from mining operations and ore and waste from development operations.

9/ Includes aplite.

10/ Excludes volcanic cinder and scoria; included with crushed and broken stone.

11/ Includes abrasives, boron minerals, bromine, emery, greensand marl, iodine, iron oxide pigments, kyanite, lithium minerals, magnesite, magnesium compounds, olivine, perlite, potash, sericite, sodium sulfate, sulfur (Frasch), vermiculite, wollastonite, zeolites, and industrial mineral items indicated by symbol W.

12/ Less than 1/2 unit.

13/ Includes State items indicated by symbol W.

TABLE 3  
VALUE OF PRINCIPAL MINERAL PRODUCTS AND BYPRODUCTS OF SURFACE AND UNDERGROUND MINES  
IN THE UNITED STATES IN 1997 1/

(Dollars per metric ton)

Commodity	Surface			Underground			All mines		
	Principal mineral product	By-product	Total	Principal mineral product	By-product	Total	Principal mineral product	By-product	Total
<b>Metals:</b>									
Copper 2/	6.79	0.83	7.62	W	W	W	6.79	0.83	7.62
Gold	12.44	0.50	12.94	65.71	0.44	66.15	13.54	0.50	14.04
Iron	9.01	--	9.01	W	--	W	9.01	--	9.01
Zinc	W	W	W	48.77	W	48.77	48.77	W	48.77
Average, metals 3/	9.14	0.79	9.93	28.86	4.09	32.95	10.12	0.96	11.08
<b>Industrial minerals:</b>									
Abrasives	5,760.16	--	5,760.16	--	--	--	5,760.16	--	5,760.16
Barite	12.21	--	12.21	--	--	--	12.21	--	12.21
Clays	40.58	W	40.58	W	--	W	40.58	W	40.58
Diatomite	113.19	--	113.19	--	--	--	113.19	--	113.19
Feldspar 4/	25.78	W	25.78	--	--	--	25.78	W	25.78
Garnet	97.49	--	97.49	--	--	--	97.49	--	97.49
Gypsum	7.18	--	7.18	6.64	--	6.64	7.11	--	7.11
Iodine	14,882.33	--	14,882.33	--	--	--	14,882.33	--	14,882.33
Mica (scrap)	30.92	W	30.92	--	--	--	30.92	W	30.92
Phosphate rock	6.61	W	6.61	--	--	--	6.61	W	6.61
Pumice 5/	27.84	--	27.84	--	--	--	27.84	--	27.84
Salt	W	--	W	18.41	W	18.41	18.41	W	18.41
<b>Sand and gravel:</b>									
Construction	4.46	0.06	4.52	W	--	W	4.46	0.06	4.52
Industrial	18.09	0.63	18.72	--	--	--	18.09	0.63	18.72
Soda ash	W	W	W	84.70	W	84.70	84.70	W	84.70
<b>Stone:</b>									
Crushed	5.64	0.01	5.65	5.99	W	5.99	5.66	0.01	5.66
Dimension	190.42	0.11	190.53	221.45	--	221.45	191.48	0.11	191.59
Talc and pyrophyllite	31.85	--	31.85	W	--	W	31.85	--	31.85
Tripoli	201.86	--	201.86	--	--	--	201.86	--	201.86
Average, industrial minerals 3/	6.75	0.06	6.81	19.08	0.59	19.67	7.26	0.08	7.34
Average, industrial minerals 3/ (excluding sand and gravel and stone)	19.81	0.29	20.10	31.04	1.13	32.17	21.95	0.45	22.40
Average, metals and industrial minerals 3/	7.47	0.28	7.75	22.47	1.80	24.27	8.13	0.35	8.47
Average, metals and industrial minerals 3/ (excluding sand and gravel and stone)	11.06	0.70	11.76	29.94	2.62	32.56	12.54	0.85	13.39

W Withheld to avoid disclosing company proprietary data; included in appropriate "Average."

1/ Values calculated from unrounded data; may not add to totals shown because of independent rounding.

2/ With increased adoption of leaching technology there may be less distinction between ore and waste. Significant tonnages of low-grade material, formerly classified as waste are now being considered as low-grade leachable ore by some companies, resulting in a large shift in the ore to waste ratios and a reduction in ore value.

3/ Includes unpublished data for metals: beryllium concentrate, gold-silver ore, lead, magnesium metal, manganese ore, molybdenum, platinum and palladium, rare-earth metal concentrate, silver, titanium, and uranium; industrial minerals: asbestos, boron minerals, bromine, emery, greensand marl, iron oxide pigments, kyanite, lithium minerals, magnesite, magnesium compounds, olivine, perlite, potash, sericite, sodium sulfate, sulfur (Frasch), vermiculite, wollastonite, zeolites, and items indicated by symbol W.

4/ Includes aplite.

5/ Excludes volcanic cinder and scoria; included with crushed and broken stone.

TABLE 4  
NUMBER OF DOMESTIC METAL AND INDUSTRIAL MINERAL MINES IN THE UNITED STATES IN 1997,  
BY COMMODITY AND STATE 1/2/

Commodity	Total number of mines	Less than 1,000 tons	1,000 to 10,000 tons	10,000 to 100,000 tons	100,000 to 1,000,000 tons	1,000,000 to 10,000,000 tons	More than 10,000,000 tons
<b>Metal ores:</b>							
Beryllium	1	--	--	1	--	--	--
Copper	26	1	--	--	3	9	13
Gold	93	4	1	3	24	57	4
Gold-silver	1	--	--	--	--	1	--
Iron	12	--	--	1	2	1	8
Lead	9	--	--	--	6	3	--
Magnesium metal	4	--	--	1	1	2	--
Manganiferous (5% to 35% Mn)	1	--	1	--	--	--	--
Molybdenum	3	--	--	--	--	3	--
Platinum and palladium	1	--	--	--	1	--	--
Rare earth metal concentrates	1	--	--	--	1	--	--
Silver	4	--	--	2	1	1	--
Titanium	4	--	--	1	2	--	1
Uranium	9	7	1	1	--	--	--
Zinc	11	--	--	--	8	3	--
<b>Total</b>	<b>180</b>	<b>12</b>	<b>3</b>	<b>10</b>	<b>49</b>	<b>80</b>	<b>26</b>
<b>Industrial minerals:</b>							
Abrasives	8	8	--	--	--	--	--
Barite	6	--	1	--	5	--	--
Boron minerals	3	1	--	1	--	1	--
Bromine	6	--	--	6	--	--	--
Clays	744	19	220	393	112	--	--
Diatomite	13	1	--	8	4	--	--
Emery	1	1	--	--	--	--	--
Feldspar 3/	7	--	2	3	2	--	--
Garnet	5	1	1	3	--	--	--
Greensand marl	1	--	1	--	--	--	--
Gypsum	60	1	4	10	45	--	--
Iodine	4	4	--	--	--	--	--
Iron oxide pigments	4	2	1	1	--	--	--
Kyanite	2	--	--	--	2	--	--
Lithium minerals	3	1	--	1	1	--	--
Magnesite	1	--	--	--	1	--	--
Magnesium compounds	6	--	1	2	1	2	--
Mica (scrap)	10	1	5	3	1	--	--
Olivine	4	--	1	3	--	--	--
Perlite	9	--	3	3	3	--	--
Phosphate rock	18	--	--	--	1	7	10
Potash	10	--	--	3	1	6	--
Pumice 4/	15	--	4	10	1	--	--
Salt	67	2	5	7	43	10	--
<b>Sand and gravel:</b>							
Construction	6,980	129	1,450	3,330	1,960	116	--
Industrial	121	1	3	49	67	1	--
Sericite	1	--	1	--	--	--	--
<b>Sodium compounds:</b>							
Soda ash	7	--	--	--	2	5	--
Sodium sulfate	2	--	--	--	2	--	--
<b>Stone:</b>							
Crushed	3,100	33	226	863	1,600	369	2
Dimension	179	60	86	33	--	--	--
Sulfur (Frasch)	2	--	--	--	1	1	--
Talc and pyrophyllite	20	5	4	6	5	--	--
Tripoli	6	1	1	4	--	--	--
Vermiculite	12	--	--	12	--	--	--
Wollastonite	2	--	--	1	1	--	--
Zeolites	5	1	2	2	--	--	--
<b>Total</b>	<b>11,400</b>	<b>272</b>	<b>2,020</b>	<b>4,750</b>	<b>3,870</b>	<b>518</b>	<b>12</b>
<b>Grand total</b>	<b>11,600</b>	<b>284</b>	<b>2,030</b>	<b>4,760</b>	<b>3,920</b>	<b>598</b>	<b>38</b>

See footnotes at end of table.

TABLE 4--Continued  
NUMBER OF DOMESTIC METAL AND INDUSTRIAL MINERAL MINES IN THE UNITED STATES IN 1997,  
BY COMMODITY AND STATE 1/ 2/

Commodity	Total number of mines	Less than 1,000 tons	1,000 to 10,000 tons	10,000 to 100,000 tons	100,000 to 1,000,000 tons	1,000,000 to 10,000,000 tons	More than 10,000,000 tons
States:							
Alabama	174	2	10	73	71	18	--
Alaska	188	14	8	154	5	7	--
Arizona	216	5	14	71	103	15	8
Arkansas	148	8	21	61	47	11	--
California	495	18	53	182	188	53	1
Colorado	313	3	55	168	78	9	--
Connecticut	76	--	11	35	29	1	--
Delaware	14	--	1	5	8	--	--
Florida	153	2	6	31	77	26	11
Georgia	244	2	31	88	95	28	--
Hawaii	29	--	4	12	12	1	--
Idaho	191	7	20	95	59	10	--
Illinois	276	4	11	87	152	22	--
Indiana	226	--	16	65	124	21	--
Iowa	366	7	33	209	109	8	--
Kansas	398	6	185	108	96	3	--
Kentucky	124	--	6	21	80	17	--
Louisiana	101	--	7	39	47	8	--
Maine	185	2	60	96	27	--	--
Maryland	88	2	7	29	39	11	--
Massachusetts	133	3	14	51	59	6	--
Michigan	454	3	50	221	160	18	2
Minnesota	592	4	139	347	89	7	6
Mississippi	100	--	16	42	42	--	--
Missouri	342	4	48	118	156	16	--
Montana	222	7	93	78	41	2	1
Nebraska	173	--	18	108	44	3	--
Nevada	179	5	17	39	72	42	4
New Hampshire	77	1	6	38	32	--	--
New Jersey	89	1	5	31	42	10	--
New Mexico	147	14	20	71	32	8	2
New York	532	18	140	198	167	9	--
North Carolina	261	9	42	92	96	21	1
North Dakota	144	--	26	101	15	2	--
Ohio	369	11	27	124	186	21	--
Oklahoma	144	9	13	50	62	10	--
Oregon	309	13	52	140	97	7	--
Pennsylvania	354	12	32	102	186	22	--
Rhode Island	21	--	2	4	15	--	--
South Carolina	139	--	15	67	46	11	--
South Dakota	270	13	85	131	36	5	--
Tennessee	196	--	6	67	105	18	--
Texas	438	11	46	131	219	31	--
Utah	214	2	24	79	97	11	1
Vermont	129	8	32	67	19	3	--
Virginia	182	6	19	41	93	22	1
Washington	340	1	35	182	114	8	--
West Virginia	69	1	4	24	37	3	--
Wisconsin	782	39	303	309	126	5	--
Wyoming	217	2	121	61	27	6	--
Grand total	11,600	284	2,030	4,760	3,920	598	38

1/ Based on crude ore mined.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes apilite.

4/ Excludes volcanic cinder and scoria; included with crushed stone.

TABLE 5  
 TWENTY-FIVE LEADING METAL AND INDUSTRIAL MINERAL MINES AND QUARRIES  
 IN THE UNITED STATES IN 1997, IN ORDER OF OUTPUT OF CRUDE ORE

Type of ore and mine, quarry or operation 1/	State	Operator	Commodity	Mining method
<b>Metal ores:</b>				
Morenci	Arizona	Phelps Dodge Corp.	Copper	Open pit.
Tyrone	New Mexico	do.	do.	Do.
Bagdad	Arizona	Cyprus Climax Metals Co.	do.	Do.
Minttac	Minnesota	USX	Iron	Do.
Bingham Canyon	Utah	Kennecott, Utah Copper Corp.	Copper	Do.
Carlin Mines Complex	Nevada	Newmont Gold Co.	Gold	Open pit and stoping.
Sierrita	Arizona	Cyprus Climax Metals Co.	Copper	Open pit.
Hibbing	Minnesota	Cleveland-Cliffs, Inc.	Iron	Do.
Cyprus Miami (Inspiration)	Arizona	Cyprus Climax Metals Co.	Copper	Do.
Empire	Michigan	Cleveland-Cliffs, Inc.	Iron	Do.
Hoyt Lakes	Minnesota	do.	do.	Do.
Round Mountain	Nevada	Round Mountain Gold Corp.	Gold	Do.
Ray Pit	Arizona	ASARCO Incorporated	Copper	Do.
Pinto Valley	do.	BHP Copper Inc.	do.	Do.
Mission Complex	do.	ASARCO Incorporated	do.	Open pit and stoping.
National Steel	Minnesota	National Steel Pellet Co.	Iron	Open pit.
San Manuel	Arizona	BHP Copper Inc.	Copper	Stoping.
Chino	New Mexico	Chino Mines Co.	do.	Open pit.
Tilden	Michigan	Cleveland-Cliffs, Inc.	Iron	Do.
Thunderbird	Minnesota	EVTAC Mining	do.	Do.
Mesquite	California	Newmont Gold Co.	Gold	Do.
Continental	Montana	Montana Resources Inc.	Copper	Do.
Twin Creeks	Nevada	Newmont Gold Co.	Gold	Do.
Robinson	do.	BHP Copper Inc.	Gold and copper	Do.
Peter Mitchell	Minnesota	Northshore Mining Co.	Iron	Do.
<b>Industrial minerals:</b>				
Florida mines (6)	Florida	IMC-Agrico Co.	Phosphate rock	Do.
Florida mines (2)	do.	Cargill Fertilizer Inc.	do.	Do.
South Pasture	do.	C F Industries Inc.	do.	Do.
Support	Virginia	Luck Stone Corp	Stone	Open quarry.
Aurora	North Carolina	PCS Phosphate	Phosphate rock	Open pit.
F E C Quarry	Florida	CSR America Inc.	Stone	Open quarry.
Calcite Operation	Michigan	Michigan Limestone Operations	do.	Do.
Georgetown	Texas	Texas Crushed Stone Co.	do.	Do.
Beckmann	do.	Redland Aggregates North America, Redland Stone Products Co.	do.	Do.
White Rock Quarries (1)	Florida	Vecellio & Grogan Inc.	do.	Dredging
Pennsoco	do.	Tarmac America Inc.	do.	Do.
McCook 378	Illinois	Vulcan Materials Co.	do.	Open quarry.
IMCF-Carlsbad	New Mexico	IMC Kalium, Carlsbad Potash	Potash	Stoping.
Stoneport Quarry	Michigan	Presque Isle Corp.	Stone	Open quarry.
Crushed Limestone Operation	Missouri	Tower Rock Stone Co.	do.	Do.
Sheldon/Peoria	California	Calmat Co., Inc.	Sand and gravel	Open pit.
Cape Sandy	Indiana	Mulzer Crushed Stone Co., Inc.	Stone	Open quarry.
Star Pit	Florida	Bergeron Sand & Rock	do.	Do.
Millville	West Virginia	Millville Quarry Inc	do.	Do.
Bridgeport	Texas	Texas Industries, Inc., Bridgeport Stone Co.	do.	Do.
Thornton	Illinois	General Dynamics Corp., Material Service Corp.	do.	Open quarry and stoping.
Gregg Mine	Florida	Florida Crushed Stone Co.	do.	Open quarry.
Norcross	Georgia	Vulcan Materials Co.	do.	Do.
Point of Mountain	Utah	Monroe Inc.	Sand and gravel	Open pit.
Mount Hope	New Jersey	Mount Hope Rock Products Inc.	Stone	Open quarry.

1/ Owing to commodity reporting differences, the rank of individual mining operations may not be available.



TABLE 6  
 TWENTY-FIVE LEADING METAL AND INDUSTRIAL MINERAL MINES AND QUARRIES  
 IN THE UNITED STATES IN 1997, IN ORDER OF OUTPUT OF TOTAL MATERIAL HANDLED

Type of ore and mine, quarry or operation 1/	State	Operator	Commodity	Mining method
<b>Metal ores:</b>				
Morenci	Arizona	Phelps Dodge Corp.	Copper	Open pit.
Bagdad	do.	Cyprus Climax Metals Co.	do.	Do.
Carlin Mines Complex	Nevada	Newmont Gold Co.	Gold	Open pit and stoping.
Cyprus Miami (Inspiration)	Arizona	Cyprus Climax Metals Co.	Copper	Open pit.
Robinson	Nevada	BHP Copper Inc.	Gold and copper	Do.
Goldstrike	do.	Barrick Gold Corp.	Gold	Open pit and stoping.
Bingham Canyon	Utah	Kennecott, Utah Copper Corp.	Copper	Open pit.
Chino	New Mexico	Chino Mines Co.	do.	Do.
Twin Creeks	Nevada	Newmont Gold Co.	Gold	Do.
Tyrone	New Mexico	Phelps Dodge Corp.	Copper	Do.
Minntac	Minnesota	USX	Iron	Do.
Sierrita	Arizona	Cyprus Climax Metals Co.	Copper	Do.
Empire	Michigan	Cleveland-Cliffs, Inc.	Iron	Do.
Hoyt Lakes	Minnesota	do.	do.	Do.
Round Mountain	Nevada	Round Mountain Gold Corp.	Gold	Do.
Jerritt Canyon	do.	Independence Mining Co.	do.	Open pit and stoping.
Pinto Valley	Arizona	BHP Copper Inc.	Copper	Open pit.
McCoy/Cove	Nevada	Echo Bay Mines Ltd.	Gold	Do.
Hibbing	Minnesota	Cleveland-Cliffs, Inc.	Iron	Do.
Mesquite	California	Newmont Gold Co.	Gold	Do.
Tilden	Michigan	Cleveland-Cliffs, Inc.	Iron	Do.
Mission Complex	Arizona	ASARCO Incorporated	Copper	Open pit and stoping.
Florida Canyon	Nevada	Florida Canyon Mining Inc.	Gold	Open pit.
Hycroft	do.	Hycroft Resources & Development Inc.	do.	Do.
Lone Tree	do.	Newmont Gold Co.	do.	Do.
<b>Industrial minerals:</b>				
Florida mines (6)	Florida	IMC-Agrico Co.	Phosphate rock	Do.
Florida mines (2)	do.	Cargill Fertilizer Inc.	do.	Do.
Boron	California	U.S. Borax Inc.	Boron	Do.
South Pasture	Florida	C F Industries Inc.	Phosphate rock	Do.
Aurora	North Carolina	PCS Phosphate	do.	Open pit.
Support	Virginia	Luck Stone Corp	Stone	Open quarry.
F E C Quarry	Florida	CSR America Inc.	do.	Do.
Calcite Operation	Michigan	Michigan Limestone Operations	do.	Do.
Georgetown	Texas	Texas Crushed Stone Co.	do.	Do.
Beckmann	do.	Redland Aggregates North America, Redland Stone Products Co.	do.	Do.
White Rock Quarries (1)	Florida	Vecellio & Grogan Inc.	do.	Dredging
Pennsuco	do.	Tarmac America Inc.	do.	Do.
McCook 378	Illinois	Vulcan Materials Co.	do.	Open quarry.
Stoneport Quarry	Michigan	Presque Isle Corp.	do.	Do.
IMCF-Carlsbad	New Mexico	IMC Kalium, Carlsbad Potash	Potash	Stoping.
Crushed Limestone Operation	Missouri	Tower Rock Stone Co.	Stone	Open quarry.
Cape Sandy	Indiana	Mulzer Crushed Stone Co., Inc.	do.	Do.
Star Pit	Florida	Bergeron Sand & Rock	do.	Do.
Sheldon/Peoria	California	Calmat Co., Inc.	Sand and gravel	Open pit.
Millville	West Virginia	Millville Quarry Inc	Stone	Open quarry.
Bridgeport	Texas	Texas Industries, Inc., Bridgeport Stone Co.	do.	Do.
Gregg Mine	Florida	Florida Crushed Stone Co.	do.	Do.
Norcross	Georgia	Vulcan Materials Co.	do.	Do.
Thornton	Illinois	General Dynamics Corp., Material Service Corp.	do.	Open quarry and stoping.
Mount Hope	New Jersey	Mount Hope Rock Products Inc.	do.	Open quarry.

1/ Owing to commodity reporting differences, the rank of individual mining operations may not be available.

TABLE 7  
MARKETABLE PRODUCT AND ORE TREATED OR SOLD AT SURFACE AND UNDERGROUND MINES  
IN THE UNITED STATES IN 1997, BY SELECTED COMMODITY AND STATE 1/

(Thousand metric tons)

Commodity	Marketable product			Ore treated or sold		
	Surface	Underground	Total	Surface	Underground	Total
<b>Metal ores:</b>						
Copper	2,000 2/	W	2,000	646,000 3/	W	646,000
Gold	W	W	W	257,000	5,420	262,000
Iron ore	62,700 2/	W	62,700	208,000 3/	W	208,000
Molybdenum	W	W	W	17,100 3/	W	17,100
Silver	W	W	W	1,620 3/	W	1,620
Zinc	W	642 4/	642	W	7,870 5/	7,870
<b>Industrial minerals:</b>						
Asbestos	7	--	7	W	--	W
Barite	692	--	692	1,270	--	1,270
Clays	40,900 2/	W	40,900	40,900 3/	W	40,900
Diatomite	766	--	766	1,630	--	1,630
Feldspar 6/	579	--	579	944	--	944
Garnet	61	--	61	61	--	61
Gypsum	16,000	2,620	18,600	16,000	2,620	18,600
Iodine	1	--	1	1	--	1
Magnesium compounds	474	--	474	W	--	W
Mica (scrap)	180	--	180	251	--	251
Phosphate rock	45,900	--	45,900	163,000	--	163,000
Potash	W	3,760 4/	3,760	W	16,600 5/	16,600
Pumice 7/	577	--	577	577	--	577
Salt	4,820	30,400	35,200	4,820	30,400	35,200
<b>Sand and gravel:</b>						
Construction	955,000 2/	W	955,000	955,000 3/	W	955,000
Industrial	26,200	--	26,200	26,200	--	26,200
Soda ash	W	10,800 4/	10,800	W	10,800 5/	10,800
<b>Stone:</b>						
Crushed	1,370,000	51,900	1,420,000	1,370,000	51,900	1,420,000
Dimension	1,100	39	1,140	1,100	39	1,140
Talc and pyrophyllite	1,150 2/	W	1,150	1,160 3/	W	1,160
Tripoli	81	--	81	81	--	81
Vermiculite	159	--	159	W	--	W
Zeolites	28	--	28	28	--	28
<b>States:</b>						
Alabama	60,100 2/	W	60,100	60,100 3/	W	60,100
Alaska	16,400 2/	W	16,400	35,000 3/	W	35,000
Arizona	49,600 2/	W	49,600	495,000 3/	W	495,000
Arkansas	41,300	--	41,300	41,300	--	41,300
California	173,000 2/	W	173,000	217,000 3/	W	217,000
Colorado	42,500	37	42,600	59,000 3/	W	59,000
Connecticut	11,200	--	11,200	11,200	--	11,200
Delaware	2,540	--	2,540	2,540	--	2,540
Florida	129,000	317	129,000	248,000 3/	W	248,000
Georgia	84,200 2/	W	84,200	84,700 3/	W	84,700
Hawaii	5,940	--	5,940	5,940	--	5,940
Idaho	25,800 2/	W	25,800	44,100	515	44,600
Illinois	104,000 2/	W	104,000	104,000 3/	W	104,000
Indiana	83,900 2/	W	83,900	83,900 3/	W	83,900
Iowa	45,400	6,790	52,200	45,400	6,790	52,200
Kansas	35,400	3,740	39,100	35,400	3,740	39,100
Kentucky	56,200	15,800	72,000	56,200	15,800	72,000
Louisiana	19,200	15,100	34,300	19,200	15,100	34,300
Maine	8,880	--	8,880	8,880	--	8,880
Maryland	37,800 2/	W	37,800	37,800 3/	W	37,800
Massachusetts	25,900 2/	W	25,900	25,900 3/	W	25,900
Michigan	125,000	891	125,000	155,000	891	156,000
Minnesota	97,700	--	97,700	215,000	--	215,000
Mississippi	19,700	--	19,700	19,700	--	19,700
Missouri	75,000	5,900	80,900	75,000	13,200	88,200

See footnotes at end of table.

TABLE 7--Continued  
 MARKETABLE PRODUCT AND ORE TREATED OR SOLD AT SURFACE AND UNDERGROUND MINES  
 IN THE UNITED STATES IN 1997, BY SELECTED COMMODITY AND STATE 1/

(Thousand metric tons)

Commodity	Marketable product			Ore treated or sold		
	Surface	Underground	Total	Surface	Underground	Total
States--Continued:						
Montana	11,900 2/	W	11,900	32,900	983	33,900
Nebraska	20,800 2/	W	20,800	20,800 3/	W	20,800
Nevada	31,900	1	31,900	218,000	3,140	221,000
New Hampshire	10,500	--	10,500	10,500	--	10,500
New Jersey	40,500	--	40,500	40,500	--	40,500
New Mexico	14,400	2,530	17,000	W	16,600	16,600 8/
New York	77,800 2/	W	77,800	74,800	3,820	78,600
North Carolina	84,300	--	84,300	91,200	--	91,200
North Dakota	9,420	--	9,420	9,420	--	9,420
Ohio	124,000	2,800	127,000	124,000	2,800	127,000
Oklahoma	47,000 2/	W	47,000	47,000 3/	W	47,000
Oregon	40,800	--	40,800	41,200	--	41,200
Pennsylvania	103,000	3,820	106,000	103,000	3,820	106,000
Rhode Island	4,000	--	4,000	4,000	--	4,000
South Carolina	36,500 2/	W	36,500	41,700 3/	W	41,700
South Dakota	16,400	(9/)	16,400	22,400	1,230	23,700
Tennessee	66,200	5,120	71,300	66,200	9,620	75,800
Texas	149,000	10,200	159,000	164,000 3/	W	164,000
Utah	48,500 2/	W	48,500	106,000 3/	W	106,000
Vermont	12,000 2/	W	12,000	12,000 3/	W	12,000
Virginia	85,300 2/	W	85,300	85,600 3/	W	85,600
Washington	55,800 2/	W	55,800	56,600 3/	W	56,600
West Virginia	17,900	2,620	20,500	17,900	2,620	20,500
Wisconsin	64,100 2/	W	64,100	64,100 3/	W	64,100
Wyoming	11,900	9,710	21,600	11,900	9,710	21,600

W Withheld to avoid disclosing company proprietary data.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes marketable product from underground operations.

3/ Includes ore treated at underground operations.

4/ Includes marketable product from surface operations.

5/ Includes ore treated from surface operations.

6/ Includes aplite.

7/ Excludes volcanic cinder and scoria; included with crushed and broken stone.

8/ Excludes ore treated from surface operations.

9/ Less than 1/2 unit.

TABLE 8  
MINING METHODS USED AT SURFACE OPERATIONS  
IN THE UNITED STATES, BY COMMODITY, IN 1997

(Percent of total material handled)

Commodity	Preceded by drilling and blasting	Not preceded by drilling and blasting 1/
<b>Metal ores:</b>		
Beryllium concentrate	100	--
Copper	100	--
Gold	99	1
Gold-silver	100	--
Iron	95	5
Magnesium metal	93	7
Manganiferous (5% to 35% Mn)	--	100
Molybdenum	100	--
Rare earth metal concentrates	100	--
Silver	98	2
Titanium	--	100
Uranium	--	100
Zinc	100	--
Average	98	2
<b>Industrial minerals:</b>		
Abrasives	100	--
Barite	44	56
Boron minerals	100	--
Bromine	--	100
Clays	--	100
Diatomite	--	100
Emery	100	--
Feldspar 2/	100	--
Garnet	52	48
Greensand marl	--	100
Gypsum	94	6
Iodine	--	100
Iron oxide pigments	81	19
Kyanite	100	--
Lithium minerals	93	7
Magnesite	100	--
Magnesium compounds	42	58
Mica (scrap)	11	89
Olivine	72	28
Perlite	17	83
Phosphate rock	6	94
Potash	--	100
Pumice 3/	5	95
Salt	2	98
<b>Sand and gravel:</b>		
Construction	--	100
Industrial	--	100
Sericite	100	--
Soda ash	--	100
<b>Stone:</b>		
Crushed	99	1
Dimension	1	99
Sulfur (Frasch)	--	100
Talc and pyrophyllite	87	13
Tripoli	96	4
Vermiculite	2	98
Wollastonite	100	--
Zeolites	100	--
Average	51	49
Average, metals and industrial minerals	74	26

See footnotes at end of table.

TABLE 8--Continued  
 MINING METHODS USED AT SURFACE OPERATIONS  
 IN THE UNITED STATES, BY COMMODITY, IN 1997

1/ Includes drilling and cutting without blasting, dredging, and mechanical excavation and non-float washing, and other surface mining methods.

2/ Includes aplite.

3/ Excludes volcanic cinder and scoria; included with crushed and broken stone.

TABLE 9  
 EXPLORATION ACTIVITY IN THE UNITED STATES IN 1997, BY METHOD, COMMODITY, AND STATE 1/

(Meters)

	Churn drilling	Diamond drilling	Percussion drilling	Rotary and reverse circulation drilling	Other drilling	Trenching	Total
<b>Commodities:</b>							
Copper	(2/)	30,600	--	12,100	8,690	--	51,400
Gold	(2/)	117,000	W	502,000	5,180	9,410	633,000
Molybdenum	--	1,070	--	--	--	--	1,070
Vanadium	--	--	--	962	--	--	962
Zinc	--	167,000	W	495	--	--	168,000
Other 3/	--	34,900	218,000	211,000	8,110	(4/)	471,000
Total	(2/)	351,000	218,000	726,000	22,000	9,410	1,330,000
Percent of total	1	27	16	55	1	1	100
<b>States:</b>							
Alaska	(2/)	93,500	--	28,500	W	5,110	127,000
Arizona	(2/)	30,600	--	W	W	--	30,600
California	--	1,910	W	W	W	W	1,910
Colorado	--	8,420	W	57,800	--	--	66,200
Idaho	--	18,100	--	W	--	--	18,100
Kentucky	--	8,990	--	--	--	--	8,990
Nevada	--	41,900	3,660	233,000	--	W	279,000
South Dakota	--	42,900	--	W	--	--	42,900
Washington	--	22,900	--	495	--	--	23,400
Undistributed 5/	--	81,600	214,000	406,000	22,000	4,300	727,000
Total	(2/)	351,000	218,000	726,000	22,000	9,410	1,330,000
Percent of all States	1	27	16	55	1	1	100

W Withheld to avoid disclosing company proprietary data; included with "Other" or "Undistributed."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Withheld to avoid disclosing company proprietary data; included with "Other drilling."

3/ Includes beryllium concentrate, boron minerals, diatomite, gypsum, iron, lead, lithium minerals, silver, talc and pyrophyllite, titanium, uranium, vermiculite, and commodity items indicated by symbol W.

4/ Less than 1/2 unit.

5/ Includes Alaska, Arizona, Arkansas, California, Colorado, Florida, Idaho, Minnesota, Missouri, Montana, Nevada, New Mexico, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Utah, Wyoming, and State items indicated by symbol W.