

# 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 1996 were reported on the Mine, Development, and Mineral Exploration Supplement, a statistical survey conducted by the USGS. Additional data for 1996 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 1996, as shown in this report, include the annual data for both the construction sand and gravel commodities and the data for the commodities of crushed and dimension stone. Prior to 1994, these mineral commodities were surveyed biennially and appeared alternately in this report. The inclusion of both sets of these 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 1994-96 data with previously reported annual data possible.

Total domestic mining of nonfuel mineral materials amounted to 5.6 billion metric tons in 1996, a 4% increase above that of 1995. These materials included 3.5 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, 53% was for the production of industrial minerals and 47% 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, a slight increase above that of 1995. Crude ore mined at these surface operations was 2.4 billion tons, and the remaining 434 million tons was waste and ore from development. Underground mining for industrial minerals amounted to only 111 million tons, of which 98% was crude ore.

Total surface mining for metal ores came to 2.6 billion tons, a 6% increase compared with that of 1995. Of the 2.6 billion tons, about 950 million 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 51 million tons, of which 94% was crude ore.

The major States in which mining for nonfuel minerals occurred were, in order of total material handled, Nevada, Arizona, Florida, Minnesota, California, Michigan, Texas, Utah, New Mexico, and Ohio. These 10 States accounted for more than 60% 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, 1/ BY TYPE

(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>									
1992	921	1,110	2,030	36	2	38	957	1,110	2,070
1993	921	1,140	2,060	34	2	36	955	1,140	2,100
1994	901	1,520 r/	2,420 r/	37	1	38	938	1,520 r/	2,460 r/
1995	922 r/	1,560 r/	2,480 r/	53 r/	2	55 r/	975 r/	1,560 r/	2,540
1996	949	1,670	2,620	48	3	51	997	1,680	2,670
<b>Industrial minerals:</b>									
1992 5/	991 r/	267	1,260	42 r/	(6/)	42 r/	1,030	267	1,300
1993	1,180	310	1,490	101 r/	(6/)	101 r/	1,280	311	1,590
1994	2,270 r/	425	2,690 r/	104 r/	(6/)	104 r/	2,370	425	2,800
1995	2,350	455	2,800 r/	104 r/	3	106 r/	2,450	458	2,910
1996	2,430	434	2,860	108	3	111	2,530	437	2,970
<b>All mineral commodities:</b>									
1992	1,910 r/	1,380	3,290	78 r/	2	80 r/	1,990	1,380	3,370
1993	2,100	1,450	3,550	135 r/	2	137 r/	2,230	1,450	3,680
1994	3,170 r/	1,950 r/	5,120 r/	141 r/	1	142 r/	3,310	1,950 r/	5,260 r/
1995	3,270	2,020	5,280 r/	156 r/	5	161 r/	3,420	2,020	5,450
1996	3,370	2,110	5,480	157	6	162	3,530	2,110	5,640

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/ Crushed and broken and dimension stone 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 1996,  
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	419,000	447,000	866,000	W	W	W	419,000	447,000	866,000
Gold	291,000	1,000,000	1,290,000	4,260	760	5,020	295,000	1,000,000	1,300,000
Iron	206,000	170,000	377,000	W	W	W	206,000	170,000	377,000
Platinum and palladium	--	--	--	385	330	715	385	330	715
Zinc	W	W	W	5,720	1,030	6,750	5,720	1,030	6,750
Other 5/	32,500	56,100	88,600	38,000	755	38,800	70,600	56,800	127,000
Total	949,000	1,670,000	2,620,000	48,400	2,870	51,300	997,000	1,680,000	2,670,000
<b>Industrial minerals:</b>									
Barite	1,270	714	1,980	--	--	--	1,270	714	1,980
Clays	40,000	34,800	74,800	W	W	W	40,000	34,800	74,800
Diatomite	1,310	W	1,310	--	--	--	1,310	W	1,310
Feldspar 6/	850	W	850	--	--	--	850	W	850
Garnet	55	--	55	--	--	--	55	--	55
Gypsum	14,300	6,150	20,500	2,710	--	2,710	17,000	6,150	23,200
Mica (scrap)	262	140	402	--	--	--	262	140	402
Perlite	W	W	W	2	--	2	2	--	2
Phosphate rock	174,000	W	174,000	--	--	--	174,000	W	174,000
Potash	W	--	W	13,100	--	13,100	13,100	--	13,100
Pumice 7/	569	W	569	--	--	--	569	W	569
Salt	4,930	--	4,930	32,700	W	32,700	37,700	W	37,700
<b>Sand and gravel:</b>									
Construction	894,000	W	894,000	W	--	W	894,000	W	894,000
Industrial	25,000	W	25,000	--	--	--	25,000	W	25,000
Soda ash	W	--	W	10,200	--	10,200	10,200	--	10,200
<b>Stone:</b>									
Crushed	1,250,000	103,000	1,360,000	48,400	334	48,800	1,300,000	103,000	1,410,000
Dimension	1,480	586	2,070	50	--	50	1,530	586	2,120
Talc and pyrophyllite	802	1,770	2,570	W	--	W	802	1,770	2,570
Other 8/	12,600	287,000	300,000	1,020	2,310	3,320	13,600	289,000	303,000
Total	2,430,000	434,000	2,860,000	108,000	2,640	111,000	2,530,000	437,000	2,970,000
Grand total	3,370,000	2,110,000	5,480,000	157,000	5,510	162,000	3,530,000	2,110,000	5,640,000
<b>States:</b>									
Alabama	55,900	5,520	61,400	W	--	W	55,900	5,520	61,400
Alaska	22,600	W	22,600	W	W	W	22,600	W	22,600
Arizona	375,000	W	375,000	W	W	W	375,000	W	375,000
Arkansas	39,800	6,560	46,300	--	--	--	39,800	6,560	46,300
California	197,000	68,500	265,000	W	W	W	197,000	68,500	265,000
Colorado	51,500	W	51,500	6,120	W	6,120	57,600	W	57,600
Connecticut	13,100	597	13,700	--	--	--	13,100	597	13,700
Delaware	2,370	--	2,370	--	--	--	2,370	--	2,370
Florida	255,000	264,000	519,000	351	3	354	255,000	264,000	520,000
Georgia	81,500	14,900	96,400	W	W	W	81,500	14,900	96,400
Hawaii	6,950	525	7,470	--	--	--	6,950	525	7,470
Idaho	50,700	43,800	94,500	368	W	368	51,100	43,800	94,900
Illinois	99,800	5,300	105,000	4,290	30	4,320	104,000	5,330	109,000
Indiana	74,200	5,290	79,500	4,600	W	4,600	78,800	5,290	84,100
Iowa	40,900	2,550	43,500	6,840	37	6,870	47,800	2,590	50,300
Kansas	33,800	2,200	36,000	3,580	7	3,580	37,400	2,210	39,600
Kentucky	52,100	4,340	56,500	12,800	90	12,900	64,900	4,430	69,400
Louisiana	15,900	515	16,500	15,300	W	15,300	31,300	515	31,800
Maine	9,140	243	9,390	--	--	--	9,140	243	9,390
Maryland	34,600	2,240	36,800	W	W	W	34,600	2,240	36,800
Massachusetts	24,200	924	25,200	W	W	W	24,200	924	25,200
Michigan	143,000	70,900	213,000	829	--	829	143,000	70,900	214,000
Minnesota	205,000	104,000	310,000	--	--	--	205,000	104,000	310,000
Mississippi	16,500	1,160	17,700	--	--	--	16,500	1,160	17,700
Missouri	73,300	6,280	79,600	11,800	W	11,800	85,200	6,280	91,500
Montana	35,100	W	35,100	791	W	791	35,900	W	35,900

See footnotes at end of table.

TABLE 2--Continued  
MATERIAL HANDLED AT SURFACE AND UNDERGROUND MINES IN THE UNITED STATES IN 1996,  
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:									
Nebraska	17,400	599	18,000	W	W	W	17,400	599	18,000
Nevada	239,000	835,000	1,070,000	2,110	715	2,830	241,000	835,000	1,080,000
New Hampshire	9,030	134	9,160	--	--	--	9,030	134	9,160
New Jersey	33,000	1,540	34,600	--	--	--	33,000	1,540	34,600
New Mexico	36,800	W	36,800	14,200	W	14,200	50,900	W	50,900
New York	71,700	5,310	77,100	4,600	W	4,600	76,300	5,310	81,700
North Carolina	81,600	10,200	91,700	--	--	--	81,600	10,200	91,700
North Dakota	8,200	W	8,200	--	--	--	8,200	W	8,200
Ohio	112,000	6,710	119,000	4,500	W	4,500	117,000	6,710	123,000
Oklahoma	40,200	2,940	43,100	W	W	W	40,200	2,940	43,100
Oregon	40,500	2,110	42,600	--	--	--	40,500	2,110	42,600
Pennsylvania	94,600	7,020	102,000	4,960	35	4,990	99,500	7,060	107,000
Rhode Island	3,440	108	3,550	--	--	--	3,440	108	3,550
South Carolina	40,300	7,360	47,700	--	--	--	40,300	7,360	47,700
South Dakota	21,100	24,200	45,300	W	--	W	21,100	24,200	45,300
Tennessee	60,100	5,140	65,300	8,820	W	8,820	68,900	5,140	74,100
Texas	153,000	9,960	163,000	10,100	W	10,100	163,000	9,960	173,000
Utah	90,400	W	90,400	W	W	W	90,400	W	90,400
Vermont	8,490	408	8,890	W	--	W	8,490	408	8,890
Virginia	69,400	5,420	74,800	W	W	W	69,400	5,420	74,800
Washington	51,600	1,360	53,000	W	--	W	51,600	1,360	53,000
West Virginia	14,700	1,170	15,900	2,900	15	2,910	17,600	1,180	18,800
Wisconsin	58,100	2,820	61,000	--	--	--	58,100	2,820	61,000
Wyoming	11,700	3,070	14,800	9,110	--	9,110	20,800	3,070	23,900
Undistributed 9/	--	564,000	564,000	27,700	4,580	32,300	27,700	569,000	597,000
Grand total	3,370,000	2,110,000	5,480,000	157,000	5,510	162,000	3,530,000	2,110,000	5,640,000

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/ Includes beryllium concentrate, gold-silver ore, lead, magnesium metal, molybdenum, nickel, rare earth concentrates, silver, tin, titanium, uranium, and metal items indicated by symbol W.

6/ Includes aplite.

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

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

9/ 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 1996 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>Metal ores:</b>									
Copper	9.69	1.53	11.22	W	W	W	9.69	1.53	11.22
Gold	11.52	0.66	12.18	69.89	0.30	70.19	12.22	0.66	12.88
Iron	8.55	--	8.55	W	W	W	8.55	W	8.55
Average, metals 2/	10.55	1.13	11.68	30.88	3.66	34.54	11.53	1.25	12.78
<b>Industrial minerals:</b>									
Barite	11.83	--	11.83	W	--	W	11.83	--	11.83
Clays	42.06	W	42.06	W	--	W	42.06	W	42.06
Diatomite	117.19	--	117.19	--	--	--	117.19	--	117.19
Feldspar 3/	21.27	W	21.27	--	--	--	21.27	W	21.27
Gypsum	6.97	W	6.97	7.13	--	7.13	6.99	W	6.99
Magnesium compounds	89.26	W	89.26	--	--	--	89.26	W	89.26
Mica (scrap)	24.59	W	24.59	--	--	--	24.59	W	24.59
Phosphate rock	6.13	W	6.13	--	--	--	6.13	W	6.13
Potash	W	W	W	17.13	--	17.13	17.13	W	17.13
Pumice 4/	24.19	--	24.19	--	--	--	24.19	--	24.19
Salt	82.40	--	82.40	19.27	0.07	19.34	27.04	0.06	27.10
<b>Sand and gravel:</b>									
Construction	4.36	0.07	4.43	W	--	W	4.36	0.07	4.43
Industrial	17.67	0.75	18.42	--	--	--	17.67	0.75	18.42
Soda ash	W	W	W	89.84	W	89.84	89.84	W	89.84
<b>Stone:</b>									
Crushed	5.34	0.01	5.35	6.54	W	6.54	5.39	0.01	5.40
Dimension	150.49	1.66	152.15	174.95	--	174.95	151.28	1.60	152.89
Talc and pyrophyllite	30.86	W	30.86	W	--	W	30.86	W	30.86
Average, industrial minerals 2/	6.57	0.06	6.64	20.09	0.55	20.64	7.14	0.09	7.22
Average, industrial minerals 2/ (excluding sand and gravel and stone)	19.01	0.27	19.28	30.96	1.00	31.95	21.32	0.41	21.73
Average, metals and industrial minerals 2/	7.69	0.36	8.05	23.44	1.52	24.95	8.37	0.41	8.78
Average, metals and industrial minerals 2/ (excluding sand and gravel and stone)	12.29	0.95	13.24	30.92	2.19	33.11	13.82	1.05	14.87

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/ Includes unpublished data for metals: beryllium concentrate, gold-silver ore, lead, magnesium metal, molybdenum, nickel, platinum and palladium, rare-earth metal concentrate, silver, titanium, and zinc, and industrial minerals: abrasives (silica stone), asbestos, boron minerals, bromine, emery, fluorspar, garnet, greensand marl, iodine, iron oxide pigments, kyanite, lithium minerals, magnesite, olivine, perlite, sodium sulfate, sulfur (Frasch), tripoli, vermiculite, wollastonite, and zeolites, and items indicated by symbol W.

3/ Includes aplite.

4/ 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 1996,  
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 concentrate	1	--	--	--	1	--	--
Copper	27	1	--	1	4	10	11
Gold	88	1	4	5	20	53	5
Gold-silver	1	--	--	--	--	1	--
Iron	16	--	--	4	2	2	8
Lead	9	--	--	--	6	3	--
Magnesium metal	3	--	--	1	1	1	--
Molybdenum	3	--	--	--	1	2	--
Nickel	1	--	--	1	--	--	--
Platinum and palladium	1	--	--	--	1	--	--
Rare earth metal concentrates	1	--	--	--	1	--	--
Silver	3	--	--	1	1	1	--
Titanium	4	--	1	--	2	1	--
Uranium	9	7	2	--	--	--	--
Zinc	14	--	--	--	11	3	--
<b>Total</b>	<b>181</b>	<b>9</b>	<b>7</b>	<b>13</b>	<b>51</b>	<b>77</b>	<b>24</b>
<b>Industrial minerals:</b>							
Abrasives	9	9	--	--	--	--	--
Barite	9	--	2	3	4	--	--
Boron minerals	4	2	--	--	1	1	--
Bromine	6	--	--	6	--	--	--
Clays	703	30	130	441	102	--	--
Diatomite	12	1	--	8	3	--	--
Emery	1	1	--	--	--	--	--
Feldspar 3/	9	1	3	3	2	--	--
Garnet	4	--	1	3	--	--	--
Greensand marl	1	--	1	--	--	--	--
Gypsum	57	--	3	12	42	--	--
Iodine	4	4	--	--	--	--	--
Iron oxide pigments	7	6	--	1	--	--	--
Kyanite	2	--	--	--	2	--	--
Lithium minerals	3	1	--	1	1	--	--
Magnesite	1	--	--	--	1	--	--
Magnesium compounds	5	--	1	1	3	--	--
Mica (scrap)	8	--	5	1	2	--	--
Olivine	4	--	1	3	--	--	--
Perlite	8	--	4	1	3	--	--
Phosphate rock	19	--	--	--	1	8	10
Potash	9	--	--	3	--	6	--
Pumice 4/	15	2	4	7	2	--	--
Salt	68	--	5	10	42	11	--
<b>Sand and gravel:</b>							
Construction	7,540	145	1,770	3,550	1,960	112	--
Industrial	118	--	8	45	64	1	--
<b>Sodium compounds:</b>							
Soda ash	7	--	--	--	2	5	--
Sodium sulfate	2	--	--	--	2	--	--
<b>Stone:</b>							
Crushed	3,400	231	272	903	1,660	333	1
Dimension	217	56	126	33	2	--	--
Sulfur (Frasch)	2	--	--	--	1	1	--
Talc and pyrophyllite	18	3	2	9	4	--	--
Tripoli	5	1	1	3	--	--	--
Vermiculite	13	--	--	13	--	--	--
Wollastonite	3	--	--	2	1	--	--
Zeolites	6	2	2	2	--	--	--
<b>Total</b>	<b>12,300</b>	<b>495</b>	<b>2,340</b>	<b>5,070</b>	<b>3,910</b>	<b>478</b>	<b>11</b>
<b>Grand total</b>	<b>12,500</b>	<b>504</b>	<b>2,350</b>	<b>5,080</b>	<b>3,960</b>	<b>555</b>	<b>35</b>

See footnotes at end of table.

TABLE 4--Continued  
NUMBER OF DOMESTIC METAL AND INDUSTRIAL MINERAL MINES IN THE UNITED STATES IN 1996,  
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	196	--	29	80	70	17	--
Alaska	189	12	5	162	7	3	--
Arizona	254	20	33	75	100	18	8
Arkansas	153	11	16	64	50	12	--
California	563	24	76	204	215	43	1
Colorado	355	9	76	182	76	12	--
Connecticut	89	--	11	45	32	1	--
Delaware	10	--	1	3	6	--	--
Florida	165	--	3	39	89	24	10
Georgia	271	3	29	117	97	25	--
Hawaii	30	--	5	11	13	1	--
Idaho	237	4	44	115	67	7	--
Illinois	297	2	24	95	152	24	--
Indiana	245	--	23	68	135	19	--
Iowa	367	3	33	224	101	6	--
Kansas	349	2	133	113	99	2	--
Kentucky	119	--	6	15	84	14	--
Louisiana	107	5	5	42	48	7	--
Maine	196	5	78	84	29	--	--
Maryland	89	5	11	24	37	12	--
Massachusetts	138	4	17	52	60	5	--
Michigan	476	3	86	216	151	18	2
Minnesota	555	2	74	381	85	7	6
Mississippi	105	--	10	52	41	2	--
Missouri	357	14	53	106	169	15	--
Montana	207	16	49	106	31	4	1
Nebraska	178	--	20	118	37	3	--
Nevada	508	6	349	56	54	39	4
New Hampshire	76	--	8	41	27	--	--
New Jersey	80	1	3	24	43	9	--
New Mexico	146	13	28	63	32	9	1
New York	599	25	147	253	164	10	--
North Carolina	267	10	42	101	96	17	1
North Dakota	150	6	20	105	18	1	--
Ohio	371	9	27	127	183	25	--
Oklahoma	155	6	15	61	65	8	--
Oregon	587	190	154	145	94	4	--
Pennsylvania	359	11	32	108	188	20	--
Rhode Island	22	--	2	7	13	--	--
South Carolina	150	--	17	75	50	8	--
South Dakota	264	7	99	127	26	5	--
Tennessee	201	4	12	58	109	18	--
Texas	481	27	25	162	237	30	--
Utah	195	2	37	80	65	10	1
Vermont	141	8	34	81	18	--	--
Virginia	190	10	18	45	99	18	--
Washington	384	8	55	194	122	5	--
West Virginia	67	2	1	23	37	4	--
Wisconsin	690	4	247	304	129	6	--
Wyoming	104	2	13	60	23	6	--
Grand total	12,500	504	2,350	5,080	3,960	555	35

1/ Based on crude ore mined.

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

3/ Includes aplite.

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

TABLE 5  
 TWENTY-FIVE LEADING METAL AND INDUSTRIAL MINERAL MINING OPERATIONS  
 IN THE UNITED STATES IN 1996, IN ORDER OF OUTPUT OF CRUDE ORE

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

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 MINING OPERATIONS  
 IN THE UNITED STATES IN 1996, IN ORDER OF OUTPUT OF TOTAL MATERIAL HANDLED

Type of ore and mining operation 1/	State	Operator	Commodity	Mining method
<b>Metal ores:</b>				
Morenci	Arizona	Phelps Dodge Corp.	Copper	Open pit.
Carlin Mines Complex	Nevada	Newmont Gold Co.	Gold	Open pit and stoping.
Goldstrike	do.	Barrick Gold Corp.	do.	Do.
Robinson	do.	BHP Copper Inc.	Gold and copper	Open pit.
Twin Creeks	do.	Santa Fe Pacific Gold Corp.	Gold	Do.
Chino	New Mexico	Chino Mines Co.	Copper	Do.
Bingham Canyon	Utah	Kennecott, Utah Copper Corp.	do.	Do.
Cyprus Miami (Inspiration)	Arizona	Cyprus Climax Metals Co.	do.	Do.
Sierrita	do.	do.	do.	Do.
Minnnac	Minnesota	USX	Iron	Do.
Empire	Michigan	Cleveland-Cliffs, Inc.	do.	Do.
Bagdad	Arizona	Cyprus Climax Metals Co.	Copper	Do.
McCoy Cove	Nevada	Echo Bay Mining Co.	Gold	Do.
Hoyt Lakes	Minnesota	Cleveland-Cliffs, Inc.	Iron	Do.
Golden Sunlight	Montana	Placer Dome U.S. Inc.	Gold	Do.
Round Mountain	Nevada	Round Mountain Gold Corp.	do.	Do.
Hibbing	Minnesota	Cleveland-Cliffs, Inc.	Iron	Do.
Cortez	Nevada	Placer Dome U.S. Inc.	Gold	Do.
Pinto Valley	Arizona	BHP Copper Inc.	Copper	Do.
Lone Tree	Nevada	Santa Fe Pacific Gold Corp.	Gold	Do.
Florida Canyon	do.	Pegasus Gold Inc.	do.	Do.
Mesquite	California	Santa Fe Pacific Gold Corp.	do.	Do.
Hycroft (Crofoot-Lewis)	Nevada	Granges Inc.	do.	Do.
Thompson Creek	Idaho	Thompson Creek Metals Co.	Molybdenum	Do.
Thunderbird	Minnesota	EVTAC Mining	Iron	Do.
<b>Industrial minerals:</b>				
Florida mines (6)	Florida	IMC-Agrico Co.	Phosphate rock	Do.
Fort Meade	do.	Cargill Fertilizer Inc.	do.	Do.
Boron	California	U.S. Borax, Inc.	Boron minerals	Do.
Aurora	North Carolina	PCS Phosphate	Phosphate rock	Do.
F E C Quarry	Florida	CSR America Inc.	Stone	Open quarry.
Reed Quarry	Kentucky	Vulcan Materials Co.	do.	Do.
Nichols	Florida	Agrifos L.L.C.	Phosphate rock	Open pit.
Beckmann	Texas	Redland Aggregates North America, Redland Stone Products Co.	Stone	Open quarry.
Hardee	Florida	C F Industries Inc.	Phosphate rock	Open pit.
Calcite Operation	Michigan	Michigan Limestone Operations	Stone	Open quarry.
Georgetown	Texas	Texas Crushed Stone Co.	do.	Do.
Pennsoco	Florida	Tarmac America Inc.	do.	Dredging
White Rock Quarries (1)	do.	Vecellio & Grogan Inc.	do.	Do.
McCook 378	Illinois	Vulcan Materials Co.	Stone	Open quarry.
Stoneport Quarry	Michigan	Presque Isle Corp.	do.	Do.
International	New Mexico	IMC Kalium, Carlsbad Potash	Potash	Stoping.
Bridgeport	Texas	Texas Industries, Inc., Bridgeport Stone Co.	Stone	Open quarry.
Thornton	Illinois	General Dynamics Corp., Material Service Corp.	do.	Open quarry and stoping.
Cape Sandy	Indiana	Mulzer Crushed Stone Co., Inc.	do.	Open quarry.
Crushed Limestone Operation	Missouri	Tower Rock Stone Co.	do.	Do.
Norcross	Georgia	Vulcan Materials Co.	do.	Do.
Pebble Beach	California	LG Everist, Inc.	do.	Do.
Sheldon/Peoria	do.	Calmat Co., Inc.	Sand and gravel	Open pit.
Mojave	do.	Onoda Cement Co., California Portland Cement	Stone	Open quarry.
Kennesaw	Georgia	Vulcan Materials Co.	do.	Do.

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 1996, 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	1,820	W	1,820	432,000	W	432,000
Gold	W	W	W	296,000	3,630	299,000
Iron	61,800	W	61,800	206,000	W	206,000
Platinum and palladium	--	W	W	--	404	404
Zinc	W	220	220	W	6,200	6,200
<b>Industrial minerals:</b>						
Asbestos	10	--	10	W	--	W
Barite	507	W	507	997	273	1,270
Clays	40,100	W	40,100	40,100	W	40,100
Diatomite	698	--	698	1,500	--	1,500
Feldspar 2/	608	--	608	1,050	--	1,050
Garnet	55	--	55	55	--	55
Gypsum	15,100	2,660	17,700	15,100	3,240	18,300
Magnesium compounds	446	--	446	2,190	--	2,190
Mica (scrap)	159	--	159	262	--	262
Phosphate rock	45,400	--	45,400	174,000	--	174,000
Potash	W	2,430	2,430	W	12,900	12,900
Pumice 3/	612	--	612	612	--	612
Salt	W	32,700	32,700	4,600	32,700	37,300
<b>Sand and gravel:</b>						
Construction	917,000	W	917,000	917,000	W	917,000
Industrial	25,000	--	25,000	25,000	--	25,000
Soda ash	W	10,200	10,200	W	10,200	10,200
<b>Stone:</b>						
Crushed	1,280,000	48,400	1,330,000	1,280,000	48,400	1,330,000
Dimension	1,480	50	1,530	1,480	50	1,530
Talc and pyrophyllite	783	W	783	789	W	789
Vermiculite	164	--	164	W	--	W
<b>States:</b>						
Alabama	56,300	W	56,300	56,300	W	56,300
Alaska	12,500	W	12,500	22,800	W	22,800
Arizona	51,000	W	51,000	387,000	W	387,000
Arkansas	40,000	--	40,000	40,000	--	40,000
California	158,000	W	158,000	200,000	W	200,000
Colorado	42,400	42	42,500	52,800	W	52,800
Connecticut	13,200	--	13,200	13,200	--	13,200
Delaware	2,370	--	2,370	2,370	--	2,370
Florida	128,000	351	129,000	255,000	351	256,000
Georgia	81,200	W	81,200	81,800	W	81,800
Hawaii	6,950	--	6,950	6,950	--	6,950
Idaho	25,400	W	25,400	51,600	368	52,000
Illinois	102,000	W	102,000	102,000	4,300	106,000
Indiana	76,900	W	76,900	76,900	4,600	81,500
Iowa	43,600	6,770	50,300	43,600	6,770	50,300
Kansas	34,600	3,570	38,200	34,600	3,570	38,200
Kentucky	54,500	12,800	67,300	54,500	12,800	67,300
Louisiana	17,500	15,300	32,800	17,500	15,300	32,800
Maine	9,230	--	9,230	9,230	--	9,230
Maryland	34,700	W	34,700	34,700	W	34,700
Massachusetts	26,100	W	26,100	26,100	W	26,100
Michigan	113,000	764	114,000	144,000	764	145,000
Minnesota	91,700	--	91,700	206,000	--	206,000
Mississippi	16,800	--	16,800	16,800	--	16,800
Missouri	74,000	5,410	79,400	74,000	12,300	86,300
Montana	11,800	308	12,200	35,400	810	36,200
Nebraska	17,700	W	17,700	17,700	W	17,700
Nevada	28,600	W	28,600	244,000	1,770	246,000
New Hampshire	9,120	--	9,120	9,120	--	9,120

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 1996, BY SELECTED COMMODITY AND STATE 1/

(Thousand metric tons)

Commodity	Marketable product			Ore treated or sold		
	Surface	Underground	Total	Surface	Underground	Total
States--Continued:						
New Jersey	36,400	--	36,400	36,400	--	36,400
New Mexico	15,400	2,450	17,900	35,400	14,200	49,600
New York	73,600	3,970	77,600	73,600	4,590	78,200
North Carolina	76,300	--	76,300	82,300	--	82,300
North Dakota	8,380	--	8,380	8,380	--	8,380
Ohio	114,000	4,500	119,000	114,000	4,500	119,000
Oklahoma	42,100	W	42,100	42,100	W	42,100
Oregon	40,800	--	40,800	41,100	--	41,100
Pennsylvania	98,800	4,960	104,000	98,800	4,960	104,000
Rhode Island	3,530	--	3,530	3,530	--	3,530
South Carolina	35,200	--	35,200	40,400	--	40,400
South Dakota	14,700	W	14,700	21,900	W	21,900
Tennessee	61,500	4,170	65,700	61,500	9,300	70,800
Texas	155,000	10,100	165,000	155,000	10,100	165,000
Utah	32,800	W	32,800	89,500	W	89,500
Vermont	8,670	W	8,670	8,670	W	8,670
Virginia	70,900	W	70,900	71,400	W	71,400
Washington	53,900	W	53,900	54,000	W	54,000
West Virginia	14,700	2,900	17,600	14,700	2,900	17,600
Wisconsin	60,400	--	60,400	60,800	--	60,800
Wyoming	12,100	9,110	21,200	12,100	9,110	21,200

W Withheld to avoid disclosing company proprietary data.

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

2/ Includes aplite.

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

TABLE 8  
MINING METHODS USED AT SURFACE OPERATIONS  
IN THE UNITED STATES, BY COMMODITY, IN 1996

(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	99	1
Gold	99	1
Gold-silver	100	--
Iron	92	8
Magnesium metal	83	17
Molybdenum	100	--
Nickel	5	95
Rare earth metal concentrates	100	--
Silver	100	--
Titanium	--	100
Uranium	--	100
Zinc	100	--
Average	98	2
<b>Industrial minerals:</b>		
Abrasives	100	--
Barite	39	61
Boron minerals	100	--
Bromine	--	100
Clays	--	100
Diatomite	3	97
Emery	100	--
Feldspar 2/	95	5
Garnet	51	49
Greensand marl	--	100
Gypsum	89	11
Iodine	--	100
Iron oxide pigments	82	18
Kyanite	100	--
Lithium minerals	91	9
Magnesite	100	--
Magnesium compounds	57	43
Mica (scrap)	6	94
Olivine	76	24
Perlite	20	80
Phosphate rock	3	97
Potash	--	100
Pumice 3/	48	52
Salt	1	99
<b>Sand and gravel:</b>		
Construction	--	100
Industrial	--	100
Soda ash	--	100
<b>Stone:</b>		
Crushed	98	2
Dimension	21	79
Sulfur (Frasch)	--	100
Talc and pyrophyllite	90	10
Tripoli	97	3
Vermiculite	2	98
Wollastonite	95	5
Zeolites	19	81
Average	49	51
Average, metals and industrial minerals	72	28

1/ Includes drilling and cutting without blasting, dredging, and mechanical excavation and nonfloat 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 1996, 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	--	20,200	--	55,400	--	--	75,500
Gold	--	131,000	W	723,000	W	3,610	857,000
Lead	--	30,800	W	W	W	--	30,800
Zinc	--	W	195,000	W	W	--	195,000
Other 2/	--	67,700	58,000	239,000	163,000	3	527,000
Total	--	249,000	253,000	1,020,000	163,000	3,620	1,690,000
Percent of total	--	15	15	60	10	(3/)	100
<b>States:</b>							
Alaska	--	39,500	--	23,200	--	1,070	63,800
Arizona	--	22,300	--	W	--	W	22,300
California	--	W	--	124,000	2,080	--	126,000
Idaho	--	6,830	--	19,200	W	2,130	28,200
Kentucky	--	4,260	--	--	--	--	4,260
Missouri	--	30,800	W	W	--	--	30,800
Montana	--	7,880	30	3,340	--	--	11,200
Nevada	--	63,600	W	478,000	W	W	542,000
South Dakota	--	2,090	--	W	--	381	2,470
Undistributed 4/	--	72,100	253,000	369,000	161,000	34	855,000
Total	--	249,000	253,000	1,020,000	163,000	3,620	1,690,000
Percent of all States	--	15	15	60	10	(3/)	100

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

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

2/ Includes beryllium concentrates, boron minerals, diatomite, gypsum, iron ore, iron oxide pigments, olivine, silver, crushed stone, uranium, vermiculite, wollastonite, zeolites, and commodity items indicated by symbol W.

3/ Less than 1/2 unit.

4/ Includes Iowa, Minnesota, New Mexico, New York, North Carolina, Oklahoma, Oregon, South Carolina, Tennessee, Utah, Virginia, Washington, Wyoming, and State items indicated by symbol W.