THE MINERAL INDUSTRY OF NEW MEXICO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Bureau of Mines, U.S. Department of the Interior, and the New Mexico Bureau of Mines and Mineral Resources for collecting information on all nonfuel minerals.

New Mexico ranked 12th among the 50 States in total nonfuel mineral production value [1] in 1996, according to the U.S. Geological Survey (USGS). The State was 11th in 1995. The estimated value for 1996 was $963 million, a 15% decrease from that of 1995. This followed a 21.5% increase from 1994 to 1995 (based on final 1995 data). The State accounted for about 2.5% of the U.S. total nonfuel mineral production value.

Copper and potash, by value, were the top nonfuel minerals mined in New Mexico. The two mineral commodities together accounted for 83% of the State's total nonfuel mineral production value and were about 15 times the value of New Mexico's next highest mineral commodity, construction sand and gravel. Most of the fluctuation in the value of New Mexico's mineral production was attributable to copper. In 1995, copper production rose about 7% at the same time that average annual copper prices rose by 25% to a record-high level. This resulted in a $190-million, or 33%, rise in the value of copper production in 1995. In 1996, despite a 2% rise in production, the value of copper declined by about 20%, or $150 million, owing to a fall in the average annual copper price. In 1996, potash also decreased in value *(see table 1)*, but the change was small relative to that of copper. Nonfuel minerals that increased in value in 1996 included those of construction sand and gravel, portland cement, gold, salt, silver, gypsum, iron ore, and gemstones. Other nonfuel minerals that decreased included crushed stone, perlite, and molybdenum. Pumice and mica also showed decreases for the year, but these were marginal. In 1995, in addition to the change in copper, a decrease in the value of potash was mostly offset by an increase in the value of portland cement.

Based on USGS estimates of the quantities produced in the 50 States during 1996, New Mexico continued to lead the Nation in potash, perlite, and zeolites. The State also remained second in pumice and crude mica production and third in copper. In addition, significant quantities of construction sand and gravel and gypsum were mined in the State.

The following narrative information was provided by the New Mexico Bureau of Mines and Mineral Resources[2] (BMMR). Production data in the following text are those reported by the BMMR, based on canvass survey data collected by New Mexico's Department of Energy, Minerals and Natural Resources (DEMNR) and related information collected by the BMMR. They may differ from some production figures reported to the USGS. The largest porphyry-copper deposit in New Mexico is Phelps Dodge Corp.'s Chino Mine at Santa Rita, where copper sulfides occur in the upper, fractured granodiorite and adjacent sedimentary rocks. According to the company's annual reports, Phelps Dodge produced a record 699,000 metric tons[3] of copper in 1996, including 3,400 tons of copper from precipitates at Tyrone, 69,000 tons of copper from electrowining at Tyrone, 90,000 tons of copper from concentrate at Santa Rita, and 63,000 tons of copper from electrowining at Santa Rita. The Tyrone porphyry-copper deposit in the Burro Mountains occurs within a quartz-monzonite laccolith and adjacent Proterozoic rocks. The concentrator processed approximately 270 million tons of ore grading 0.81% copper from 1969 to 1992. Before closing, approximately 386 million tons of ore grading 0.35% copper had been leached. Leachable reserves are estimated as 209 million tons of ore grading 0.35% copper. An Environmental Impact Statement (EIS) is being prepared for expansion at Santa Rita.

Mining continues at the Continental Mine in the Fierro-Hanover district, where Cobre Mining Co. Inc. reports reserves of more than 9 million tons of 0.92% copper. At the end of 1996, proven and probable reserves were estimated as 820,000 tons of copper. Expansion of the existing pit and new development of the porphyry-copper deposit at Hanover Mountain were delayed by a ruling from the U.S. Bureau of Land Management that Cobre must complete an EIS first. The EIS is scheduled for completion in September 1997, and the expansion and new development is anticipated for late 1997 or early 1998. Cobre Mining announced a merger with Aurex Resources Corp., a Canadian company, in March 1997.

The opening of Alta Gold Co.'s Copper Flat Mine at Hillsboro was delayed until preparation of an EIS (draft released February 1996). The New Mexico Mines and Minerals Department held public hearings in late 1996, and a mining permit may be issued before yearend 1997. No production is anticipated until 1999. The Copper Flat deposit, discovered in 1975, consists of copper, gold,

molybdenum, and silver disseminated in a quartz-monzonite stock and in quartz veins. Unlike the Santa Rita and Tyrone deposits, there is no supergene enrichment zone at Copper Flat; Copper Flat is a high-grade hypogene deposit with low pyrite. Quintana Minerals Corp., prior to closure of the mine, produced approximately 3,000 tons of copper in March through June 1982. Minable reserves were estimated in 1984 as 54 million tons of 0.42% copper and 0.012% molybdenum (Dunn, 1982). Current reserves of the deposit are estimated as 221,000 tons copper, 7,120 tons molybdenum, 100 tons silver, and 7.6 tons gold (Dillard, 1995).

The Questa molybdenum mine, Questa, NM, was being prepared for operation. Molycorp. Inc., a subsidiary of Unocal Corp., operates Questa. A new section of the mine has been developed for use of load haul dump vehicles, and production is expected to be about 460 metric tons of contained molybdenum per month (Blossom, 1997).

San Pedro Mining Corp. applied for and received in November, a mining permit from the DEMNR's Mining and Minerals Division to reprocess the mine dumps at the San Pedro Mine in Santa Fe County for industrial grade garnet. The company still must obtain a mining permit from the Santa Fe County Mining Commission. The county claims that mining is not an appropriate use for the area.

An independent miner in a joint venture with Micrex Mineral Development Corp. (Canadian) continues to mine gold, silver, and silica flux at the Bank Mine in the Steeple Rock district in Grant County. Approximately 450 tons of ore is stockpiled grading 12 grams per ton gold and 274 grams per ton of silver (Rubin, 1997). The vein is approximately 1 to 4 meters wide. The Bank Mine is along the Summit vein along the northwest-trending East Camp-Summit fault where Biron Bay Resources Ltd. (Toronto, Canada) announced a discovery of 1.32 million tons of ore grading 6.2 grams per metric ton gold and 353 grams per ton of silver. Biron Bay plans to start mining in the next few years. R&B Mining Co.'s Center Mine in the same district closed in early 1995.

Summo Minerals Corp. of Vancouver is applying for mining permits to mine the Copper Hill deposit in the Picuris district in Taos County. The deposit is near Dixon and would be mined by open pit methods. Preliminary drilling indicates that the deposit could yield 9,000 to 14,000 tons of copper during a 10-year mine life. Exploration is still underway.

The New Mexico Environment Department requested that the U.S. Environmental Protection Agency assist in reclamation at the Stevenson-Bennett and Torpedo Mines in the Organ Mountains mining district.

In the beginning of 1996, the Carlsbad, NM, potash producers were Eddy Potash Inc. (EP), owned by Trans-Resources Inc.; IMC Global Operations Inc., owned by IMC Global Inc.; Mississippi Potash Inc. (MP), owned by Mississippi Chemical Corp.; New Mexico Potash, Inc. (NMP), owned by Trans-Resources; and Western Ag-Minerals Inc., owned by Rayrock Resources of Toronto, Canada. In the first quarter of 1996, IMC Global Inc. and The Vigoro Corp. merged into a single company. The potash portion of the company was named IMC Kalium and includes two domestic operations, one in Carlsbad and the other in Hersey, MI. The Carlsbad operation produces muriate of potash, sulfate of potash, and sulfate of potash-magnesia. In the third quarter of 1996, Mississippi Chemical completed negotiations with Trans-Resources to purchase EP and NMP. The purchase was valued at $45 million plus an adjustment for current working capital of about $11 million. EP became a wholly owned subsidiary of MP, and NMP was merged into MP. MP annual capacity was reported to be about 232,000 tons, and the combined annual capacity of EP and NMP was placed at 481,000 tons. These three operations produce only muriate of potash. Western Ag-Mineral reported that it had brought a continuous miner into its langbeinite mine and that the miner was working well. This mine has traditionally been an undercut-drill-blast-load operation because the ore was thought to be too hard for mechanical miners. At the end of the year, only three companies, IMC Kalium, MP, and Western Ag-Mineral, were operating in Carlsbad, NM. Potash Corporation of Saskatchewan Inc. of Canada continued to market potash exports for three New Mexico operations, now in a single company owned by Mississippi Chemical, as a cost-cutting effort for the producers (Searls, 1996).

The opening of Copar Pumice Co.'s El Cajete pumice mine in the Jemez Mountains was delayed until preparation of an EIS (draft scheduled for release in early 1997). The opening of the mine was anticipated for 1997 with a 10-year mine life.

Addwest Minerals, Inc.'s Wind Mountain nepheline syenite project in southern Otero County was on hold. The nepheline syenite was to be used as a constituent in amber-colored beverage containers, ceramics, and flat glass. The nepheline syenite contains high iron compared to other commercial sources of nepheline syenite, but, when the Wind Mountain nepheline syenite is crushed and passed through a specialized rare-earth magnet, the resulting nonmagnetic product is similar in composition to Grade B product specified by Unimin Canada Ltd. The

magnetic fraction can be sold as millite, an iron-rich additive required for controlling the color of glass. Several other consumers have tested the nepheline syenite and found it suitable for use in ceramics, fiberglass, and flat glass. The lack of free silica as quartz also enables use of the Wind Mountain nepheline syenite as a silica-free abrasive. Interesting textural variations in the main mass of the syenite, wisps of finer grained material waving through the rock, also make it an attractive building stone. Mining will be underground by room-and-pillar methods. Construction of an adit, started in early 1995, continued. Processing will involve crushing, grinding, magnetic separation, and screening. At full production, Wind Mountain is expected to process 2,700 tons per day or 635,000 tons per year. Current proven, probable, and inferred reserves total 180 million tons for a mine life of more than 100 years.

Improvement in the price of uranium led to the continued operation by Quivira Mining Co. (successor to Kerr McGee Corp.) of mine water recovery of uranium from waters recovered from inactive underground operations at Ambrosia Lake, Grants, NM. Mine water recovery ceased in 1992 because of a decline in the price of uranium. Hydro Resources Inc, a subsidiary of Hydro Resources Inc., continues with plans to mine uranium by in situ leaching at Churchrock, and NZU Inc. plans to mine at Crownpoint, also by in situ leaching.

References Cited

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Rubin, B., 1997, Small mines have high hopes too!: Paydirt, no. 693, March, p. 4-5.

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[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 1996 USGS mineral production data published in this chapter are estimates as of February 1997. For some commodities (for example, construction sand and gravel, crushed stone, and portland cement), estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset, and request Document # 1000 for a telephone listing of all mineral commodity specialists, or call USGS information at (703) 648-4000 for the specialist's name and number. This telephone listing may also be retrieved over the Internet at http://minerals.er.usgs.gov/minerals/contacts/comdir.html

[2]Virginia McLemore, Geologist, authored the information submitted by the New Mexico Bureau of Mines and Mineral Resources.

[3]All tons are metric tons unless otherwise specified.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW MEXICO 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		1994 Quantity	1994 Value	1995 Quantity	1995 Value	1996 p/ Quantity	1996 p/ Value
Clays 3/		127	269	127	274	127	274
Copper 4/		234	574,000	250	764,000	W	W
Gemstones		NA	14	NA	22	NA	W
Potash (K2O)		2,450	219,000	2,330	209,000	2,330	200,000
Pumice and pumicite	metric tons	129,000	1,050	W	W	W	W
Sand and gravel (construction)		10,400	47,400	10,400	50,700	10,900	54,500
Silver 4/	metric tons	22	3,750	20	3,300	27	4,600
Stone (crushed)		3,550 5/	20,000 5/	3,660	18,800	3,600	18,700
Combined value of cement [masonry (1994), portland], gypsum, clays (fire), gold, gypsum (crude), iron ore (usable), mica (crude), molybdenum, perlite (crude), salt, stone [crushed quartzite and traprock (1994), dimension granite and marble (1995-96), dimension granite, marble, and miscellaneous (1994)], zeolites, and values indicated by symbol W		XX	65,100	XX	83,900	XX	685,000
Total		XX	930,000	XX	1,130,000	XX	963,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.
1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
2/ Data are rounded to three significant digits; may not add to totals shown.
3/ Excludes certain clays; value included with "Combined value" data.
4/ Recoverable content of ores, etc.
5/ Excludes certain stones; value included with "Combined value" data.

TABLE 2
NEW MEXICO: CRUSHED STONE 1/ SOLD OR USED BY PRODUCERS
IN 1995, BY USE 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch): Riprap and jetty stone 3/	24	$140	$5.83
Coarse aggregate, graded:			
Concrete aggregate, coarse	390	1570	4.02
Bituminous aggregate, coarse	128	714	5.58
Bituminous surface-treatment aggregate	95	330	3.47
Other graded coarse aggregate 4/	655	5320	8.12
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	1.09
Stone sand, bituminous mix or seal	6	8	1.33
Screening, undesignated	W	W	2.21
Coarse and fine aggregates:			
Graded road base or subbase	279	629	2.25
Unpaved road surfacing	34	195	5.74
Terrazzo and exposed aggregate	99	1300	13.16
Crusher run or fill or waste	49	74	1.51
Other construction materials 5/	262	651	2.48
Chemical and metallurgical:			
Cement manufacture	(6/)	(6/)	4.65
Lime manufacture	(6/)	(6/)	9.96
Unspecified: 7/			
Actual	(6/)	(6/)	3.26
Estimated	693	3160	4.56
Total	3660	18800	5.12

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."
1/ Includes granite, limestone, miscellaneous stone, quartzite, traprock and volcanic cinder and scoria.
2/ Data are rounded to three significant digits; may not add to totals shown.
3/ Includes other coarse aggregate.
4/ Includes railroad ballast.
5/ Includes roofing granules.
6/ Withheld to avoid disclosing company proprietary data; included in "Total."
7/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 3
NEW MEXICO: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1994 Number of quarries	1994 Quantity (thousand metric tons)	1994 Value (thousands)	1994 Unit value	1995 Number of quarries	1995 Quantity (thousand metric tons)	1995 Value (thousands)	1995 Unit value
Limestone 2/	22 r/	1,890 r/	$8,700 r/	$4.60 r/	20	1,640	$6,180	$3.77
Granite	11	1,250	8,620	6.92 r/	4	1,470	9,110	6.21
Volcanic cinder and scoria	10	285	2,000	7.02	5	197	1,770	8.98
Traprock	(3/)	(3/)	(3/)	(3/)	1	W	213	W
Quartzite	(3/)	(3/)	(3/)	(3/)	1	W	W	10
Sandstone	4	1	5	5.00	--	--	--	--
Miscellaneous stone	3 r/	133 r/	642 r/	4.83 r/	2	W	W	4.53
Total	XX	3,550	20,000	5.62	XX	3,660	18,800	5.12

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes "limestone-dolomite" reported with no distinction between the two.
3/ Excludes quartzite and traprock from State total to avoid disclosing company proprietary data.

TABLE 4
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1995,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1 Quantity	District 1 Value	District 2 Quantity	District 2 Value
Construction aggregates:				
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W
Coarse aggregate, graded 3/	1,220	7,870	43	63
Fine aggregate (-3/8 inch) 4/	W	W	W	W
Coarse and fine aggregate 5/	302	1,950	163	300
Other construction materials 6/	W	W	--	--
Chemical and metallurgical 7/	(8/)	(8/)	(8/)	(8/)
Unspecified 9/				
Actual	(8/)	(8/)	(8/)	(8/)
Estimated	284	1,280	409	1,880
Total	2,950	15,800	708	2,910

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes riprap and jetty stone and other coarse aggregate.
3/ Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.
4/ Includes stone sand (concrete), stone sand (bituminous mix or seal), and screening (undesignated).
5/ Includes graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and crusher run (select material or fill).
6/ Includes roofing granules.
7/ Includes cement manufacture and flux stone.
8/ Withheld to avoid disclosing company proprietary data; included in "Total."
9/ Includes production reported without a breakdown by end use and estimates for nonrespondent.

TABLE 5
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1995,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate and concrete products 2/	1,860	$9,710	$5.23
Asphaltic concrete aggregates and other bituminous mixtures	880	4,510	5.12
Road base and coverings	1,560	6,710	4.30
Fill	243	567	2.33
Other 3/	156	809	5.19
Unspecified: 4/			
Actual	3,420	16,600	4.86
Estimated	2,280	11,800	5.18
Total or average	10,400	50,700	4.88

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes plaster and gunite sands.
3/ Includes filtration, railroad ballast, and snow and ice control.
4/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 6
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1995,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	931	5,220	926	4,490
Asphaltic-bituminous mixtures	668	3,200	212	1,310
Road base and coverings	866	3,990	693	2,720
Fill	134	257	110	311
Other miscellaneous uses 3/	70	542	86	267
Unspecified: 4/				
Actual	3,410	16,600	13	61
Estimated	1,950	10,800	326	995
Total	8,030	40,600	2,370	10,200

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes plaster and gunite sands.
3/ Includes filtration, railroad ballast, and snow and ice control.
4/ Includes production reported without a breakdown by end use and estimates for nonrespondents.