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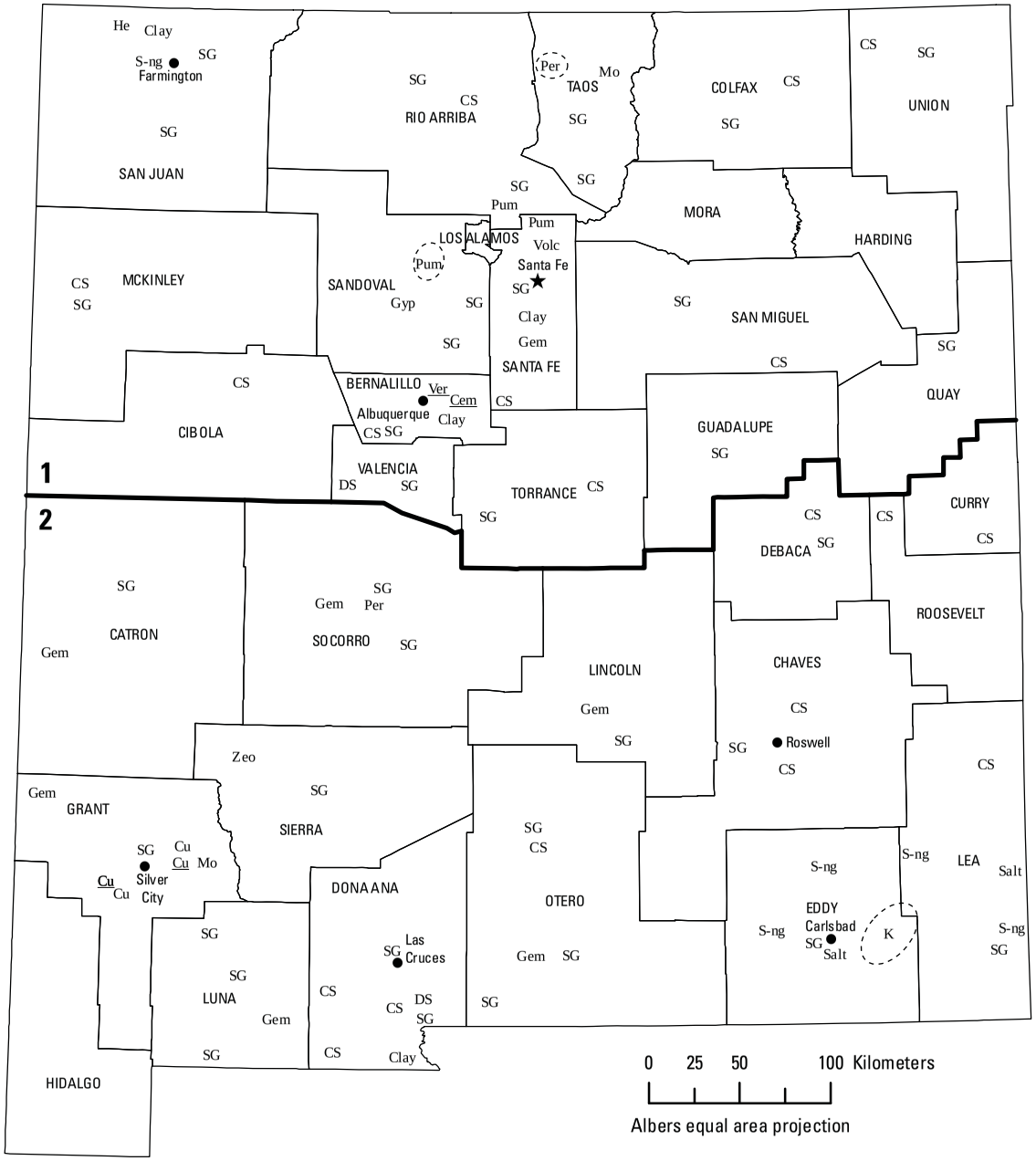

LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Major producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
DS	Dimension stone
Gem	Gemstones
Gyp	Gypsum
He	Helium
K	Potash
Mo	Molybdenum
Per	Perlite
Pum	Pumice and pumicite
S-ng	Sulfur (natural gas)
Salt	Salt
SG	Construction sand and gravel
Ver	Vermiculite plant
Volc	Volcanic cinder
Zeo	Zeolites

Concentration of mineral operations

Source: New Mexico Bureau of Geology and Mineral Resources/U.S. Geological Survey (2007).

The Mineral Industry of New Mexico

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

In 2007, New Mexico's nonfuel raw mineral production[1] was valued at $1.56 billion, based upon annual U.S. Geological Survey (USGS) data. This was an $80 million, or more than 5%, increase from the State's total nonfuel mineral value for 2006, which had increased by nearly $330 million, or up nearly 29%, from 2005 to 2006. The State continued to be 15th in rank among the 50 States in total nonfuel mineral production value and accounted for more than 2% of the U.S. total. Yet, per capita, the State ranked 7th in the Nation in its minerals industry's value of nonfuel mineral production; with a population of about 1.97 million, the value of production was about $793 per capita.

The top nonfuel minerals in 2007 were, by value of production, copper and potash, followed by construction sand and gravel, molybdenum concentrates, and cement (portland and masonry). These accounted for nearly 94% of the State's total nonfuel raw mineral production value. Copper continued to be the State's leading nonfuel mineral produced in 2007, accounting for 50% of the State's total nonfuel mineral production value. Copper has led for 37 of the past 40 years (from 1968 through 2007). Potash (reported as potassium salts prior to 1990) was the State's leading nonfuel mineral in the early 1950s through 1967, in 1982, and in 2002–03.

In 2007, substantial increases in the production values of potash and molybdenum concentrates (descending order of change), up by a combined value of approximately $70 million, led the State's increase in value for the year. These increases resulted primarily from increases in their unit values but also from increases in their production. Smaller yet significant increases also took place in the values of crushed stone (up by $6 million), portland cement, and salt, while decreases took place in the mineral commodities of pumice and pumicite, gold, and crude gypsum (table 1). The average unit values of all of the mineral commodities increased except for those of crude gypsum, pumice and pumicite, and dimension stone.

In 2007, New Mexico continued to lead the Nation in the quantities of potash, crude perlite, and zeolites produced (descending order of value) and remained third in copper, sixth in molybdenum concentrates, eighth of 10 gold-producing States, and eighth in silver as compared with production in other States. The State increased in rank to 3d from fifth in pumice and pumicite production and to 9th from 10th in that of crude gypsum. Additionally, New Mexico was a significant producer of construction sand and gravel.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the 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 2007 USGS mineral production data published in this chapter are those available as of June 2009. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

The following narrative information was provided by the New Mexico Bureau of Geology and Mineral Resources[2] (NMBGMR). Production data and information in the text that follows are those reported by the NMBGMR and are based on the agency's own surveys and estimates, data obtained from the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD), personal mine visits by NMBGMR staff, company Web sites, and cited references. These may differ from some production figures published by the USGS.

Overview and Trends

Mining in New Mexico continued to increase as most mineral commodity prices continued to rise or remain at high levels in 2007, instep with increasing demand for minerals worldwide. Copper prices (average annual COMEX prices), which ranged from $0.72 per pound to $0.84 per pound during the 1998–2003 period, rose significantly in recent years, averaging $3.09 and $3.26 per pound, respectively, in 2006 and 2007. Likewise, the price of molybdenum, (using average Platts Metals Week molybdenum prices), after hitting an annual average low of $5.20 per kilogram (kg) ($2.36 per pound) in 2001, has ranged from more than $36.18 to more than $57.03 per kg ($16.41 to $25.87 per pound) from 2004 to 2007; its highest average price was more than $69.95 per kg ($31.73 per pound) in 2005.

Active mineral operations in 2007 included 184 stone and aggregate operations, 20 other industrial mineral mines and 18 industrial mineral mills, 5 coal mines, 2 copper mines, 3 potash mines and 5 potash refineries, 1 copper concentrator and 2 solvent extraction/electrowinning (SX/EW) plants, and 1 molybdenum mine and 1 molybdenum mill (New Mexico Energy, Minerals and Natural Resources Department, 2008, p. 37). At the same time as mine production took place, nearly every company had comprehensive reclamation plans, and reclamation activities were increasing during 2007.

Exploration and Development

Nonfuel minerals exploration in the State similarly following the trends of most commodity prices continued to rise or remain at high levels during the year. In 2007, exploration permits increased and more than 400 exploration and mining permits were filed with the State.

Industrial Minerals

Clay and Shale.—Daleco Resources Corp. drilled 16 holes in 2005 at the Sierra Kaolin clay deposit (also known as the

[2]Virginia T. McLemore, Senior Economic Geologist, authored the State mineral industry information provided by the New Mexico Bureau of Geology and Mineral Resources.

Kline Mountain deposit) in the Black Range, Sierra County. Evaluation of the deposit continued in 2007 (Daleco Resources Corp., 2005). The hydrothermal kaolin deposit was found in an advanced argillic alteration zone within the tuff of Kline Mountain and was estimated to contain more than 180 million metric tons (Mt) of kaolin (Iskender, Clark, and Austin, 1994). For perspective, in 1969, about 820 t was mined for absorbent (Daleco Resources Corp., 2006).

Garnet, Industrial.—Although garnet has not been produced in New Mexico for the past decade, at least one company was examining areas in the State for resources for potential uses as an abrasive. Garnet typically has been found in skarn deposits in southern and central New Mexico, in some areas being a major constituent of waste rock piles remaining after recovery of metals (Lueth, 1996). In one example, approximately 135,000 metric tons (t) of 20% to 36% garnet was estimated to occur in four tailings piles at Hanover, Grant County (Cetin and others, 1996). Also, B.O.W. Corporation was exploring for garnet resources in the Orogrande District, which was east of Las Cruces.

Perlite.—The Atlas Minerals Inc. (formerly Toro Mining and Minerals, Inc.) was examining the Toro perlite deposit northwest of Deming, where more than 13.6 Mt of perlite have been estimated (Atlas Minerals Inc., 2003). St. Cloud Mining Co. was examining the McCauley Ranch perlite deposit in Thompson Canyon valley in Grant County.

Stone, Dimension.—Daleco Resources Inc. was evaluating the Mesa Del Oro property, Cibola County for additional travertine dimension stone production where an estimated more than 430 Mt of travertine were found (Daleco Resources Corp., 2006).

Metals

Copper.—Exploratory drilling in 1975–89 and most recently in 2006–07 northwest of the carbonate-hosted silver deposits in Lone Mountain delineated a weakly mineralized quartz latite to quartz monzonite stock surrounded by an upper copper oxide zone and two deeper, stratiform copper and lead-zinc skarn bodies, ranging in depth from 30 to 915 meters (m) (Moran and Moore, 2006). Copper One Inc. planned to continue drilling and expand studies of the area. Copper oxide horizons were approximately 30 m thick at grades of 0.1% to 0.2% copper, with rare intercepts to 0.6%. Skarn grades in the Lake Valley horizon, while variable, typically assayed from 1.5% to 3.0% copper, 3% to 5% zinc, 1% to 2% lead, 0.34 grams per metric ton (g/t) to 0.69 g/t [0.01 to 0.02 troy ounces per short ton (oz/short ton)] gold, and 34 g/t to 103 g/t (1.0 to 3.0 oz/short ton) silver. The intrusions have been dated at 51.5 to 50.6 million years ago (Moran and Moore, 2006; P. B. Hubbard and P. G. Dunn, Geologists, University of Arizona, unpublished report, 1983). Copper One planned to perform an extensive recalculation of the resources based upon current economic conditions (Copper One Inc., 2009a). Additionally, Copper One also had the Mimbres property that includes 45 unpatented lode claims and 825 hectares (ha) (2,040 acres) of New Mexico State Mining Leases over a porphyry copper-molybdenum deposit and higher-grade copper-zinc-gold-silver-bearing skarns originally discovered by Bear Creek Exploration Co. in the 1950–60s. Copper One planned for exploration drilling to further delineate specific ore bodies (Copper One Inc., 2009b).

The Gold Lake copper-molybdenum-gold porphyry deposit, being explored by General Minerals Corp. (now High Desert Gold Corp.), is in the White Signal District, where quartz monzonite and rhyolite have intruded the Proterozoic era rocks associated with porphyry-style alteration and veins (Klemmick, 2006; High Desert Gold Corp., 2007). Numerous, small, historic mine workings are found within this area, mostly being exploited and prospected for copper, gold, and uranium. General Minerals Corp. analyzed rock chip samples collected from the area, which contained anomalous copper (up to 11.5%), molybdenum (up to 0.17%), silver [up to 385 parts per million (ppm)], and bismuth (up to 2,300 ppm) (Klemmick, 2006, p. 23). Additional drilling was planned to confirm and delineate the economic potential of the property.

In 2007, Entrée Gold Inc. announced the discovery of a porphyry copper deposit in the Lordsburg District (Entrée Gold Inc., 2009). Andesites in the Lordsburg area have been dated as 67 million years ago, and the granodiorite and associated rocks have been dated as 57.3 to 58.8 million years ago (McLemore and others, 2000b, p. 6–8). Additional drilling was planned.

Gold and Silver.—Several companies explored for gold and silver throughout New Mexico, especially in Socorro, Grant, Dona Ana, Catron, Lincoln, and Rio Arriba Counties. In May, Azco Mining Inc. announced that it planned to develop the Summit Mine in the Steeple Rock District, Grant County. The Summit Mine is a volcanic epithermal deposit similar to the Carlisle and Center Mines also in the Steeple Rock District, Grant County (McLemore, 2008). On July 24, Azco Mining officially changed its name to Santa Fe Gold Corp. Santa Fe Gold purchased a ball mill and flotation plant in Lordsburg to process the Summit ore and continued with development of the engineering plans for the project (Santa Fe Gold Corp., 2008). Santa Fe Gold owned and operated the Summit project under the Lordsburg Mining Company, a wholly owned subsidiary. The project also included related property consisting of approximately 600 ha of wholly owned and leased patented and unpatented mining claims, located approximately 90 kilometers (57 miles) south of the Summit Mine near Lordsburg, Hidalgo County (Santa Fe Gold Corp., 2009). Of additional interest, in August 2004, Azco Mining Inc. had acquired the Ortiz deposit in Santa Fe County, and in December 2005 the company announced that the Carache and Lucas deposits at Ortiz contained an estimated more than 31,000 kg (1 million troy ounces) of gold resources (Azco Mining, Inc., 2005). El Capitan Precious Metals, Inc. continued to explore the El Capitan deposit for gold and silver and for platinum group metals, as well as for iron and gold from iron skarns adjacent to the El Capitan pluton in Lincoln County (El Capitan Precious Metals, Inc., 2007).

Molybdenum.—Galway Resources Ltd. announced that the Victorio Mountains deposit in Luna County contained 19.1 Mt of 0.10% molybdenum and 0.12% tungsten trioxide indicated resources with a $35 per metric ton cutoff. The inferred resources were 10.6 Mt of 0.13% molybdenum and 0.14% tungsten trioxide (SRK Consulting (USA) Inc., 2008).

Exploration continued in 2007 towards refining these results. The Victorio Mountains deposit consisted of molybdenum, tungsten, and beryllium skarns and carbonate hosted deposits associated with a Tertiary age intrusion (McLemore and others, 2000a, p. 267).

Commodity Review

Industrial Minerals

Clay and Shale.—Common clays and some fire clay were mined in New Mexico in 2007. Common clay, which typically made up most of the State's production, was used in the manufacture of bricks, quarry tile, and roofing granules. Commercial adobe yards, which produced adobe bricks from local alluvial materials, were located mostly in northern New Mexico. Bricks were also manufactured at Kinney Brick Co.'s mill in Albuquerque, Bernalillo County, and American Eagle Brick Co.'s Eagle plant in Sunland Park, Dona Ana County.

Cement.—Portland cement is a principal construction material produced in New Mexico. Masonry cement was also produced for use in mortar and stucco. The term cement commonly refers to hydraulic cement, especially portland cement; hydraulic cements have the property of hardening under water and are the chief binding agents for concrete and masonry. Seven different types of cement were produced at the Tijeras cement plant near Albuquerque operated by Grupos Cementos de Chihuahua (GCC). Production at Tijeras was begun in 1959, and GCC assumed management of its operations in 1994. Limestone required for the production of the cement is mined at the Tijeras site. Varying quantities of alumina, gypsum, iron ore, and sandstone/shale material for the cement were obtained from sources throughout New Mexico. The cement shortage that had prevailed in 2005, after lessening considerably in 2006, was over by 2007.

Gemstones.—Gemstones and semiprecious stones produced in New Mexico included agate, azurite, fluorite, geodes, moonstone, onyx, peridot, smithsonite, and turquoise. MMD production statistics for 1998–2007 are withheld (that data being proprietary) for gemstones and semiprecious stones; beyond the commercial production that is reported to the MMD is production from many small noncommercial collectors that do not report their income. In 1993, the value of gemstone production was estimated to be about $22,000 and the average during the previous 5 years was approximately $76,000, mostly from turquoise (Austin, 1994). However, owing to the depletion of identified deposits and difficulties and expenses involved in adhering to Federal, State, and local environmental regulations, most of the commercial mines have been closed. Some examples of the State's gemstone resources were turquoise, found in the Little Hatchet Mountains in Hidalgo County and Orogrande in Otero County, and peridot (a gem variety of olivine) at Buell Park, McKinley County and Kilbourne Hole and Potrillo Marr, Dona Ana County.

Gypsum.—Eagle Materials, Inc. (formerly Centex American Gypsum Co.) operated the White Mesa Mine near Cuba, Sandoval County, and two wallboard plants in Albuquerque and Bernalillo Counties. Other smaller gypsum mines were operated in Sandoval and Dona Ana Counties. Gypsum was used primarily in the manufacture of wallboard used in commercial and residential construction; other uses included the manufacture of plaster, portland cement, and as a soil conditioner.

Perlite.—In New Mexico, perlite, a weathered (hydrated), natural glass, was found in high-silica rhyolite (lava) flows and lava domes that were emplaced typically 3.3 to 7.8 million years ago (Barker and others, 1996; Chamberlin and Barker, 1996). The distinguishing feature of perlite from other volcanic glasses is that when heated above 870º C (1,600º F), it expands or pops (owing to the presence of 2% to 6% combined water) to 4 to 20 times its original volume to form lightweight, snowy white to grayish white glass foam. Perlite was produced from three mine and mill operations including Dicaperl Minerals Corp.'s El Grande and Socorro production facilities, and Dicaperl and Harborlite Corp.'s, joint operations at No Agua. Perlite was used in building construction products, filter aid, fillers, horticultural aggregate, and various other uses.

Potash.—The Carlsbad potash district is the largest potash producing area in the Nation. Intrepid Mining LLC and Mosaic Co. operated underground mines in the district. Langbeinite and sylvite are the primary potash minerals found in Permian age evaporates of the Permian Basin in New Mexico (Barker and Austin, 1996). Potash reserves in the district were estimated to be more than 500 Mt.

Mosaic Co., the 2004 consolidation of Cargill Crop Nutrition and IMC Global, has become the world's leading potash and phosphate producer. The annual capacity of the Mosaic potash mines in the State is 450,000 t of red potash and 1.1 Mt of potassium magnesium sulfate. The total reserves at Mosaic reportedly include an estimated total of 92 Mt of potash ore in three mining beds ranging in thickness from 1.4 m to 3.4 m. These ore reserves are estimated to yield 4.5 Mt of concentrate from sylvinite with an average grade of 60% potash (K_2O) and 16.3 Mt of langbeinite concentrate with an average grade of 22% K_2O. The estimated life of these reserves is 15 to 23 years.

Intrepid Mining NM LLC, the leading potash producer in the United States, processed two types of ore to produce red potash using flotation techniques, and higher-purity white potash using hot-leach crystallization methods. Intrepid's West facility, which consisted of a potash mine and refinery, was originally built in 1929 by U.S. Potash and had an annual production capacity of approximately 490,000 t of red potash. The East facility, which consisted of a potash mine, refinery, and compaction plant, had an annual production capacity of approximately 510,000 t of white potash. A third facility (North) consisted of a granular compaction plant and a structure for storage of products. Two types of ore were processed; flotation was used to produce red potash and hot-leach crystallization to produce the higher purity white potash. Intrepid employed about 650 people at these facilities in 2007. Potash was used as fertilizer and as a chemical in specialty and industrial markets.

Pumice.—Pumice was found in the Jemez Mountains and the Mogollon-Datil volcanic field of New Mexico (Hoffer, 1994), where four producing operations were active in 2007—Copar Pumice Company Inc.'s El Cajete mines and the San Ysidro plant, CR Minerals Co.'s Rocky Mountain Mine and Santa Fe

plant, and Utility Block Company Inc.'s U.S. Forest Service Mine and Utility Block mill.

Copar Pumice Company, Inc., in the pumice mining industry for more than 40 years, produced pumice from two quarries, the El Cajete Mine and Guaje Canyon. Expansion of the El Cajete Mine in the Jemez Mountains was delayed awaiting the preparation of a final environmental impact statement (EIS). A draft EIS had been released in 1997. The mine was opened in 1997 with the expectation of being operational for at least 10 years; reclamation will and has occurred as mining is completed in specific areas. Reserves at El Cajete were estimated to be about 91,000 t, and were to be used in stonewashing for denim jeans. CR Minerals Co. closed its Santa Fe mill in spring 2007 and moved its milling facilities to a new plant on the Ohkay Owingeh Pueblo. The mill site has been reclaimed and is now the site of a Rail Runner train station. The main use for pumice has been as an aggregate in lightweight building blocks and assorted building products, but other major applications for pumice and pumicite included abrasive, absorbent, concrete aggregate and admixture, filter aid, and horticultural (including landscaping).

Salt.—United Salt Corp. operated a solar evaporation salt plant near Carlsbad in 2007. United harvested the salt from a 1,050-ha salt lake after the sun and wind had evaporated the water from the brine. Following thorough washing, the salt was packaged as solar salt for use in agricultural feed products, for chemical feed stocks, for swimming pool chlorine generation, for water conditioning, and for numerous other industrial applications. New Mexico Salt and Minerals Corp. also produced solar salt from a facility in the Carlsbad area. Originally, the salt at Carlsbad was sold mostly as deicing salt for roads.

Zeolites.—St. Cloud Mining Co. (a subsidiary of Imagin Minerals, Inc.) operated the largest zeolite mine in the United States at the Stone House Mine in Sierra County. St. Cloud Mining has operated the open pit mine since 1993. The company's mining properties at Stone House consisted of 600 ha reportedly containing about 16.6 Mt of reserves with an annual capacity of 90,000 t (St. Cloud Mining Co., 2007). The zeolites mined at Stone House are found predominantly as the clinoptilolite mineral in altered tertiary volcanic tuff of Little Mineral Creek (White and others, 1996). The clinoptilolite was mined, crushed, dried, and sized without further beneficiation and shipped packaged to meet customer's specifications. St. Cloud Mining Co. in recent years made several modifications to its zeolite operation, including the addition of cation exchange capacity for added value products and additional classification capabilities to expand markets for its products. The modern facility has the crushing and sizing capacity of 450 t per day. Some zeolite was also produced at the Coyote Cliff Nos. 1 Mine (New Mexico Energy, Minerals and Natural Resources Department, 2008, p. 37). Clinoptilolite has unique physical, chemical, and cation exchange properties that can be used advantageously in agricultural, environmental, and industrial applications. Markets include animal feed supplements, air filtration media, cation exchanged products, environmental products, filtration media, floor-drying agents, industrial fillers and absorbents, mineral fillers, odor control and hygiene products (cat litter), soil conditioners, and water and wastewater treatment.

Other Industrial Minerals.—Small flagstone dimension stone operations were located throughout New Mexico that produced sandstone, travertine, and other ornamental rock. The largest was the New Mexico Travertine, Inc., a fully integrated stone processing plant located near Belen. New Mexico Travertine produced travertine for dimension stone from the Lucero quarry in Valencia County.

Helium was produced from the Shiprock and Ute Dome fields in the San Juan Basin. Helium was used in controlled atmospheres, cryogenic applications, gas mixtures, leak detection, pressurizing and purging, welding cover gas, and other uses.

New Mexico has significant deposits of humate, a weathered coal or highly organic mudstone that is found in the coal-bearing sequences, predominantly located in the Fruitland and Menefee formations in the eastern San Juan Basin. Approximately 11 billion metric tons of humate resources are located within the San Juan Basin (Hoffman and others, 1996). Humate, which is used as a soil conditioner and as an additive to drilling muds, was produced from nine mines and mills in the State: Rammsco's Eagle Mesa Mine near Cuba, Morningstar Minerals Corp.'s San Juan mill in San Juan County, Horizon Ag Products Inc.'s San Luis Mine and mill south of Cuba, Mesa Verde Resources' Star Lake Mine and San Ysidro mill, Menefee Mining Corp.'s open pit Star Lake Mine and Menefee mill, and U-Mate International Inc.'s U-Mate Mine. The mining operations, processing site, and transportation facility of U-Mate International, Inc. was in the Gallup area.

Phelps Dodge Corp. shipped magnetite (for use in cement manufacture and other minor uses) from the stockpiles at the Cobre Mining Co.'s Continental Mine.

Metals

Copper.—On March 19, Freeport-McMoRan Copper & Gold Inc. completed its acquisition of Phelps Dodge Corp. creating the world's largest publicly traded copper company (Freeport-McMoRan Copper & Gold Inc., 2007, p. 1). Freeport-McMoRan continued to leach copper at Santa Rita (the Chino Mine) and the Tyrone Mine in New Mexico in 2007.

The open pit Chino Mine (Santa Rita) is the largest known porphyry copper deposit in New Mexico. Copper sulfide ores there are contained in the upper, fractured granodiorite and adjacent sedimentary rocks, but adjacent copper skarns have become increasingly more important economically. The Chino Mine consisted of a 39,000-metric-ton-per-day concentrator that produced copper and molybdenum concentrates and a SX/EW plant (68,000 metric tons per year capacity) that produced copper cathode. In 2007, Freeport-McMoRan produced 86,200 t of copper from the concentrator and the SX/EW plant (Freeport-McMoRan Copper & Gold Inc., 2008). Total annual copper production during the next 3 years was estimated to range from 81,600 t to more than 111,000 t, along with annual molybdenum production of approximately 454 t. At yearend in 2007, estimated milling reserves in 2007 at Chino were 44 Mt grading 0.65% copper, 0.034 g/t gold, 0.48 g/t silver, and

0.018% molybdenum, and estimated leaching reserves of 88 Mt grading 0.46% Cu (Freeport-McMoRan Copper & Gold Inc., 2008). Production from these reserves was expected to extend through 2038. Freeport-McMoRan continued reclamation of the inactive areas of the Chino Mine.

The Tyrone porphyry copper deposit mine in the Burro Mountains was found within a quartz monzonite laccolith and adjacent Proterozoic era rocks. Several ore bodies, sometimes considered separate porphyry copper deposits, have been found and mined by open pit methods. The concentrator processed approximately 272 Mt of ore grading 0.81% copper from 1969 to 1992, when the mill closed and the mine began processing only for leach material. Currently, Tyrone consists of a SX/EW plant (76,200 metric tons per year capacity, or 168 million pounds per year) that produces copper cathode. In 2007, 22,700 t (50 million pounds) of copper by SX/EW were produced (Freeport-McMoRan Copper & Gold Inc., 2008). Annual copper production during the next 3 years was expected to range from 36,300 to 52,200 t (80 to 115 million pounds). At yearend 2007, leaching reserves (recoverable copper) were estimated at 150 Mt of ore grading 0.36% copper (Freeport-McMoRan Copper & Gold Inc., 2008). These reserves were expected to produce through 2018.

On February 3, 1998, Phelps Dodge Corporation (now Freeport-McMoRan Copper & Gold Inc.) acquired Cobre Mining Co., Inc. (Continental Mine). The acquisition included the open pit mine, two underground mines, two mills, and the surrounding 4,450 ha of land. On October 21, 1998, Phelps Dodge suspended underground mining at Cobre owing to low copper prices. On March 17, 1999, the remaining operations were suspended, and the entire operation has remained on care-and-maintenance status (Phelps Dodge Corp., 2007, p. 45). The deposit consists of a porphyry copper deposit and adjacent skarn deposits. At yearend 2007, estimated leaching reserves were 74 Mt of 0.41% copper (Freeport-McMoRan Copper & Gold Inc., 2008). Most of the copper reserves at the Cobre mines are in the Syrena and upper part of the Lake Valley limestones, north of the Barringer fault.

Gold and Silver.—All of the gold and silver production in New Mexico in 2007 was as byproduct recovery from copper milling by Freeport-McMoRan Copper & Gold Inc.

Molybdenum.—Molybdenum was produced from the Questa Mine in Taos County and as a byproduct of copper concentrating in Grant County. Molybdenum is a refractory metallic element used principally as an alloying agent in steel, cast iron, and superalloys to enhance hardness, strength, toughness, and wear and corrosion resistance. Molybdenum also is used in fire retardants and in catalysts, and the mineral molybdenite is used as a lubricant.

Chevron Corp.'s (formerly Molycorp Inc.) Questa molybdenum mine continuously operated from 1923 through 1986 when soft market conditions caused the temporary shutdown of the mine until 1989. Mining operations again were placed on standby in 1992 and resumed in 1995. The company mined some 81 Mt of ore from its open pit at an average grade of 0.191% molybdenum between 1965 until 1983. Underground block caving of ore commenced in 1983 and continued throughout 2007. In 2007, production was 1,770 t (3.9 million pounds) of molybdenum (Chevron Corp., 2007, p. 65). As of yearend 2007, ore grade ranged between 0.3% and 0.5% molybdenum. With demonstrated reserves considered, mine life was expected to be 25 to 35 years; when inferred resources are included, the mine life could be as much as 50 to 80 years. More than 200 people worked at the mine in 2007. Chevron also continued with a reclamation and re-vegetation program to cover overburden rock piles at the inactive open pit site. Chevron continued funding a research project at New Mexico Tech to evaluate the effects of weathering on the long-term slope stability of the waste rock piles; specific reports and theses may be obtained from http://geoinfo.nmt.edu/staff/mclemore/home.html.

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN NEW MEXICO[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2005		2006		2007	
		Quantity	Value	Quantity	Value	Quantity	Value
Clays, common		36	221	35	228	28	242
Copper[3]		131	502,000	113	784,000	108	783,000
Gemstones		NA	19	NA	23	NA	24
Sand and gravel:							
Construction		16,000	112,000	18,400	157,000	18,300	157,000
Industrial		113	W	184	W	W	W
Silver[3]	kilograms	6,390	1,510	W	W	W	W
Stone:							
Crushed		3,750	25,400	4,830 r	32,900 r	5,240	39,100
Dimension		7	279	W	W	W	W
Combined values of cement, gold, gypsum (crude), Helium [Grade–A (2006–07)], lime, molybdenum concentrates, perlite (crude), potash, pumice and pumicite, salt, zeolites, and values indicated by symbol W		XX	513,000	XX	509,000	XX	583,000
Total		XX	1,150,000	XX	1,480,000 r	XX	1,560,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data.Withheld values included in "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 no more than three significant digits; may not add to totals shown.

[3]Recoverable content of ores, etc.

TABLE 2
NEW MEXICO: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2006 Number of quarries	2006 Quantitv[r] (thousand metric tons)	2006 Value (thousands)	2007 Number of quarries	2007 Quantity (thousand metric tons)	2007 Value (thousands)
Limestone	19 [r]	2,210	$13,900 [r]	20	2,880	$21,100
Volcanic cinder and scoria	5	255	2,290	3	164	1,940
Miscellaneous stone	22 [r]	2,370	16,700 [r]	17	2,200	16,100
Total	XX	4,830	32,900 [r]	XX	5,240	39,100

[r]Revised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2007, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	99	653
Filter stone	W	W
Coarse aggregate graded:		
Concrete aggregate, coarse	27	305
Bituminous surface-treatment aggregate	W	W
Other graded coarse aggregate	383	1,220
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Screening, undesignated	W	W
Other fine aggregate	1	3
Coarse and fine aggregates:		
Graded road base or subbase	209	1,940
Crusher run or fill or waste	116	1,010
Other coarse and fine aggregates	173	2,170
Chemical and metallurgical, cement manufacture	W	W
Other miscellaneous uses and specified uses not listed	23	221
Unspecified:[2]		
Reported	149	373
Estimated	3,500	26,000
Total	5,240	39,100

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

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

TABLE 4
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2007,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	--	--
Coarse aggregate, graded[3]	W	W	W	W	--	--
Fine aggregate (-⅜ inch)[4]	W	W	W	W	--	--
Coarse and fine aggregate[5]	293	3,180	205	1,950	--	--
Other construction materials	--	--	40	361	--	--
Chemical and metallurgical[6]	W	W	--	--	--	--
Other miscellaneous uses	--	--	23	221	--	--
Unspecified[7]						
Reported	2	22	37	244	110	107
Estimated	848	6,300	2,600	20,000	--	--
Total	2,010	15,000	3,130	24,000	110	107

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone and riprap and jetty stone.

[3]Includes bituminous surface-treatment aggregate, concrete aggregate (coarse), and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, and other coarse and fine aggregates.

[6]Includes cement manufacture.

[7]Reported and estimated production without a breakdown by end use.

TABLE 5
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2007,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,110	$30,700	$9.86
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	322	3,310	10.26
Asphaltic concrete aggregates and other bituminous mixtures	2,310	24,900	10.78
Road base and coverings	1,870	13,400	7.16
Road stabilization (lime)	1	5	5.00
Fill	1,040	6,500	6.25
Railroad ballast	32	393	12.28
Other miscellaneous uses	526	11,500	21.84
Unspecified:[3]			
Reported	2,930	10,200	3.48
Estimated	6,200	56,000	9.02
Total or average	18,300	157,000	8.55

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Reported and estimated production without a breakdown by end use.

TABLE 6

NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2007, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	2,110	22,000	1,010	8,680	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	289	2,930	33	376	--	--
Asphaltic concrete aggregates and other bituminous mixtures	1,810	20,400	333	3,580	167	922
Road base and coverings[3]	1,100	8,190	766	5,190	--	--
Fill	498	4,490	543	2,020	--	--
Other miscellaneous uses[4]	454	10,800	104	1,080	--	--
Unspecified:[5]					--	--
Reported	657	4,670	159	1,350	2,120	4,200
Estimated	4,100	38,000	2,100	18,000	--	--
Total	11,000	112,000	5,010	39,900	2,280	5,120

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes railroad ballast.

[5]Reported and estimated production without a breakdown by end use.