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ARIZONA'S MINING UPDATE - 1998

Circular No. 77, November, 1997

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In 1996 Arizona again set an all-time record in copper production, producing 1.3 million tons valued at over $2.9 billion. Arizona continues leading the nation in the production of copper as well as in total non-fuel mineral production. The value of all mineral output was $3.84 billion, a decrease from 1995 due to the decline in copper prices in 1996. In addition to copper, Arizona also leads or is among the leaders in the production of gemstones, molybdenum, silver, perlite, and sand and gravel. Excluding sand and gravel operations, there are 109 active mines in Arizona producing the above commodities plus additional metals and 18 varieties of industrial minerals. There are least 70 sand and gravel producers in the state. More than 18,000 people are directly employed by the mining industry.

COPPER

Arizona's copper producers partly offset the effect of falling copper prices in 1996 by producing 4 percent more copper than in 1995 - 1,356,000 tons with a value of $2.93 billion. Copper represents over 85 percent of Arizona's nonfuel mineral value. Production comes primarily from 4 major companies, but strong demand for copper is encouraging other companies to pursue exploration and development in Arizona. The Western Economic Analysis Center reports that Arizona's economy received more than $9.6 billion and nearly 73,000 Arizona residents had jobs in 1996 as a result of the direct and indirect contributions of the copper industry. The outlook for copper appears good - world demand is up and prices have been fairly stable, averaging $1.11 per pound in the first 10 months of 1997. Producers continue to invest in new mining and milling equipment to lower costs, improve efficiency and increase capacity.

Asarco Incorporated

Asarco's world-wide copper production surpassed 1 billion pounds in 1996, establishing the company as the fourth largest copper producer in the world. Asarco's Arizona operations consist of the open-pit mines of Ray and Silver

MINERAL PRODUCTION
IN ARIZONA - 1996

COMMODITY	QUANTITY	VALUE
Clay	132,000[1]	$454,000
Copper(tons)	1,356,000	2,930,000,000
Gemstones		4,010,000
Gold(troyounces)	107,800[2]	41,800,000[2]
Sand &gravel(tons)		
Construction	46,200,000	220,000,000
Industrial	366,000	3,310,000
Silver (troy ounces)	7,720,000	40,900,000
Stone-crushed(tons)	6,170,000	33,600,000
Pigments (tons)	85	62,000
Coal (tons)	12,236,000	292,000,000[3]
Other[4]		274,000,000
TOTAL		**$4,486,877,000**

*Source: USGS, US Dept. of Energy, ADMMR.

1/Excludes bentonite clays whose value is included with "other."

2/ADMMR estimate using the 67,300 troy ounces reported by USGS with the addition of 40,300 troy ounces from a producer believed to be not included by the USGS.

3/ ADMMR estimate.

4/ Cement, clays (bentonite), gypsum, lime, molybdenum, perlite, pumice, salt, dimension stone, and iron oxide pigment.

Bell, an open-pit and underground operation at Mission, the Hayden copper smelter, and the Santa Cruz experimental copper mine.

Asarco began mining the Silver Bell North deposit, part of the Silver Bell complex near Tucson, and dedicated the mine and new processing facility on July 16, 1997. The facility's new $70 million SX-EW plant was developed as a joint venture with Mitsui & Co. U.S.A. and is expected to produce 18,000 tons of copper annually. Much of the oxide ore will come from the new pit, Silver Bell North. Rubblization and leaching of material in the El Tiro and Oxide pits will also provide solution to the SX-EW plant. Capital costs for the startup were kept down by the use of mining equipment received from the Ray and Mission mines.

Copper production at Ray mine was up from 1995 to 343 million pounds due to increased ore production as a result of improved efficiency and access to higher grade ore following completion of a stripping program. Efficiency was increased, in part, by adding 3 new 240-ton trucks and a new 56-cubic yard shovel. Late in 1996 the mine began testing a prototype truck, the Haulpak 930E Komatsu with a capacity of 310 tons! Six smaller 170-ton trucks were freed for use at Silver Bell.

Ray is the second largest mine in Arizona. It consists of an open-pit, dump and heap leach operations, a 40,000 ton-per-year SX-EW plant at Ray, and 2 mills - a 28,000 ton-per-day concentrator at Hayden and a 32,000 ton-per-day concentrator at Ray. At the end of 1996 Ray had reserves of 1 billion tons grading 0.6 percent copper.

Mission copper production increased 16 percent in 1996. Ore production was higher and average ore grade increased as the underground mine came on line supplying higher grade ores. Production totaled 261 million pounds of copper and 800,000 pounds of molybdenum. Accounting for 25 percent of Arizona's silver production, Mission was Arizona's largest silver producer with 1.96 million ounces recovered as a by-product. The Mission complex consists of the underground mine and 2 pits, Mission and the smaller, but separate, San Xavier North. Sulfide ore is treated at 2 mills, Mission and South. They have the capacity to process 63,000 tons of ore daily, resulting in an annual capacity of 124,000 tons of copper in concentrates.

Development drilling increased copper ore reserves by 7 percent to 535 million tons containing 7.4 billion pounds of copper. This drilling also identified long-term stripping requirements that led Asarco to install a conveyor system to move 58 million tons of waste a year and purchase 2 new 60 cubic-yard shovels. This allowed three 15 cubic-yard shovels to be moved to Silver Bell.

Continuous availability of the Hayden smelter, which consists of an INCO flash furnace rated at 720,000 tons of charge per year, allowed uninterrupted production throughout 1996, resulting in a record copper production of 429.8 million pounds.

President Clinton used his line item veto in October, 1997 to withdraw federal funding for the experimental in-situ leach research project at Santa Cruz. Asarco, along with joint venture partner Freeport McMoran Copper and Gold, have decided to continue the project. In 1997 copper solutions were recovered by the test well field from the undisturbed copper deposit, and copper was produced in the pilot SX-EW recovery plant. It is still too early to predict if this project's technology will be economic. It has the potential for extracting copper from deep deposits with very little surface disturbance or other impact on the environment.

BHP Copper

Magma Copper was acquired by Broken Hill Proprietary Company Ltd. (BHP) of Australia effective January, 1996. The merger made the BHP Copper the second largest copper producer in the world with 9 percent of mine production. San Manuel and Pinto Valley are the company's 2 active mining divisions in Arizona. BHP is also developing the Poston Butte deposit, an in-situ leach property that, when fully operational, will be the world's first stand-alone in-situ copper mine. BHP's Magma mine at Superior closed in June of 1996.

San Manuel is the largest underground operation in the United States and one of the largest underground copper mines in the world. San Manuel consists of a block-caving underground copper mine, a 62,000 ton-per-day concentrator, in-situ leach, a 59,000 ton-per-year SX-EW plant, a 1,300,000 ton-per-year smelter with a 3,000 ton-per-day acid plant and a 345,000 ton-per-year electrolytic refinery, and a 180,000 ton-per-year rod plant. San Manuel produced 107,000 tons of copper in the fiscal year that ended May 1, 1997. BHP's San Manuel smelter accounts for about 25 percent of U.S. copper smelting capacity. The Outokumpu flash smelt-

ing furnace is the largest single furnace smelter in the industry.

The Lower Kalamazoo orebody has estimated ore reserves of 2.1 billion pounds of contained copper that will add 12 years to the San Manuel underground mine. Production commenced in January, 1997 and is being phased in with the depletion of the San Manuel orebody over the next few years. San Manuel's and Lower Kalamazoo's estimated proven and probable ore reserves are 222 million tons of sulfide ore at an estimated grade of 0.62 percent copper, and 288 million tons of oxide ore at an average grade of 0.41 percent acid-soluble copper.

The Pinto Valley division includes the Pinto Valley mine and the Miami in-situ and Miami No. 2 tailings leach operations. The Pinto Valley mine consists of an open-pit mine, a 63,000-ton-per-day concentrator, dump leach, and 8,000 ton-per-year SX-EW plant. Miami's leach operations recover copper from in-situ leaching of the old Miami mine block cave area and by hydraulic mining and leaching of the Miami No. 2 Tailings pile. The resulting pregnant leach solutions are processed through Miami's 10,000 ton-per-year SX-EW plant. Pinto Valley's estimated recoverable proved and probable ore reserves are 572 million tons of sulfide ore at an average grade of 0.18 percent copper. The Miami in-situ project contains an additional 156 million tons at an average grade of 0.41 percent copper, while 10 million tons at 0.39 percent remain to be processed at the No. 2 Tailings pile.

BHP's Florence in-situ leach project has completed permitting and is scheduled to begin production in early 1998. The operation is expected to produce 35,000 tons of cathode copper per year for 15 years. The project is in a testing phase that includes a pilot in-situ leach and SX-EW plant. Oxide resources for the project are 321 million tons averaging 0.34 percent copper.

Cyprus Climax Metals Company

In 1996 the Cyprus Climax Metals division of Cyprus Amax produced 768 million pounds of copper and 56 million pounds of molybdenum, with much of the production coming from their Arizona operations. Cyprus is Arizona's second largest producer of copper and the world's largest producer of molybdenum. Cyprus Climax maintains headquarters in Tempe, Arizona and operates 4 copper mines in the State: Bagdad, Tohono, Miami, and Sierrita. In October of 1997 Cyprus sold their Mineral Park property to Equitorial Mining N.L. of Australia.

The Sierrita property consists of 3 open-pit copper-molybdenum mines, a 115,000 ton-per-day concentrator, 2 molybdenum roasting plants, a ferromolybdenum plant, a rhenium plant, a dump leaching operation, and an SX-EW plant. In 1996 Sierrita started mining a 70-million-ton oxide deposit that has led to an increase in cathode output. Construction has began on a new in-pit crusher and conveyor system to reduce haulage costs. Sierrita is recognized as one of the most efficient mines in the world as it operates with the lowest average copper grade, 0.27 percent, of any milling operation. A major contributing factor is the mine's by-product molybdenum credit of 19 million pounds, valued at $100 million in 1996. This figure is down from the record 24 million pounds in 1995, but still substantial. Sierrita is the largest molybdenum mine in Arizona. Sierrita contains proven and probable copper reserves to last 20 years at its present mining rate of almost 50 million tons per year.

1996 Copper Mine Production

Mine/Company	Production
Morenci/Phelps Dodge	1,019,200,000
Ray/Asarco Inc.	343,400,000
Mission/Asarco Inc.	261,200,000
Sierrita/Cyprus	231,000,000
San Manuel/BHP*	214,000,000
Bagdad/Cyprus Copper Co.	222,000,000
Pinto Valley/BHP Copper*	174,000,000
Miami/Cyrpus Copper Co.	144,000,000

*Period: June 1, 1996 - May 31, 1997

The Bagdad mine in Yavapai County produced 222 million pounds of copper in 1996. A higher capacity shovel was added to lower mining costs, and mill output was expanded by 5 percent. Sulfide production was 10 percent higher than in 1995. The operation consists of an open-pit copper-molybdenum mine, a 85,000 ton-per-day concentrator, a dump leach operation, and an SX-EW plant. Cyprus reports that Bagdad has over a billion ton proven and prob-

able ore reserve of 0.38 percent copper and 0.021 percent molybdenum.

The Miami mine consists of an open-pit copper mine, an SX-EW plant, a 650,000 ton-per-year capacity smelter, an acid plant, a 380 million-pound-annual capacity electrolytic refinery, and a 135,000 ton-per-year rod plant. The mine and SX-EW plant produced 144 million pounds of copper in 1996. The investments in the smelter and refinery at Miami have made Cyprus more efficient and self sufficient in domestic copper smelting and refining. The smelter processed 633,000 tons of copper concentrates in 1996, a new record for Miami. The Miami rod plant produced 276 million pounds of copper rod.

Cyprus' Tohono operations, located on land leased from the Tohono O'Odham Nation, consists of an SX-EW plant fed by a newly developed test open pit and heap leach. In 1996 Tohono produced 39 million pounds of copper.

Phelps Dodge Corporation

Phelps Dodge's Morenci mine in Greenlee County, the largest copper mine in North America, produced over 1 billion pounds of copper in 1996. Phelps Dodge Corporation, headquartered in Phoenix, is the world's largest producer of SX-EW cathode copper. Its mining division, Phelps Dodge Mining Company, produces about one-third of the U.S.'s mined copper at its properties in southeastern Arizona and southwestern New Mexico. In Arizona, in addition to Morenci, Phelps Dodge operates the Copper Queen in Bisbee, and controls significant undeveloped copper resources throughout the state, including the New Cornelia mine at Ajo and several deposits near Safford. Phelps Dodge owns an 85 percent interest in the Morenci mine; the remaining 15 percent is owned by Sumitomo Metal Mining Company, Ltd.

Morenci alone produces 23.6 percent of the U.S. copper production and 5.1 percent of the world production. The Morenci operation consists of the Morenci, Metcalf, and Northwest Extension open-pit copper mines, the 100,000 ton-per-day Morenci concentrator with a molybdenum circuit, the 40,000 ton-per-day Metcalf concentrator, 4 dump leaches with 3 SX plants, the new Southside EW plant with a 130-million-pound capacity, and Morenci, with a capacity of 370 million pounds annually, the worlds largest EW plant.

On May 27, 1996 a world record was set at Morenci when 1,327,800 tons of material was mined in a 24-hour period. Also in 1996, the landmark smelter stacks that were built in 1942 were downed as part of the demolition of the remainder of the smelter.

Morenci's milling and leaching reserves totaled over 1.7 billion tons at the end of 1996. Additional resources include: Coronado with 480 million tons of sulfide and oxide mineralization, Western Copper with an estimated 530 million tons of milling material at a grade of 0.55 percent copper, and 500 million tons of leach material at a grade of 0.31 percent copper, and Garfield, containing 1 billion tons grading 0.27 percent copper.

The company's Copper Queen mine consists of a small dump leaching and precipitation operation at the depleted Lavender pit. No decision has been made as to when to bring the adjacent Cochise deposit, containing 210 million tons of 0.4 percent leach material, to production.

Phelps Dodge opened a district office in Safford where feasibility studies and environmental permitting were initiated in 1996 for the Lone Star, Dos Pobres, and San Juan deposits. The Dos Pobres and San Juan deposits contain 555 million tons of leachable material and 330 million tons of sulfide with a grade of 0.65 percent copper. In late 1995, the Sanchez deposit was acquired from AZCO Mining. The acquisition increased the company's open pit, leachable copper resources in the district including Lone Star to nearly 2.4 billion tons.

In 1997 Phelps Dodge announced that a $238 million construction project is planned for the New Cornelia mine at Ajo. The project, scheduled to include a new concentrator and mining equipment, will allow resumption of mining the deposit that last operated in 1983. The sulfide resource there is 150 million tons grading 0.56 percent copper. The New Cornelia operation, which will employ about 400 people, is expected to produce 135 million pounds of copper and 25,000 ounces of gold annually, perhaps as early as 2000.

Phelps Dodge and Cominco continue a joint venture agreement on the United Verde massive sulfide deposit at Jerome. The property, one of the largest zinc resources in the U.S., contains 21 million tons grading 6.6 percent zinc, plus copper and precious metals.

Other Copper Companies

The first new major mine in Arizona in many years moved closer to reality as Carlota Copper Company, a subsidiary of Cambior U.S.A., was granted their long awaited Environmental Impact Statement and Record of Decision in July of 1997 from the Tonto National Forest. The 45-day appeal period ended on September 15 with 5 appellants. The company has not yet received approval from the Environmental Protection Agency or the Bureau of Reclamation, but approval is expected soon. The property consists of 4 oxide ore bodies, Carlota, Cactus, and North and South Eder. Mineable reserves total 96 million tons grading 0.44 percent copper.

Arimetco Incorporated produces cathode copper from the Johnson Camp mine located 65 miles east of Tucson. Reserves at Johnson Camp's producing Burro Pit are estimated at 10 million tons, while the undeveloped Copper Chief orebody contains reserves estimated at 17.8 million tons.

Equitorial Mining exercised their option to purchase Mineral Park from Cyprus Climax Metals Company on October 1, 1997. Mineral Park is an open-pit copper-molybdenum mine located in Mohave County. Equitorial plans to double production of the SX-EW operation that produced 5 million pounds of copper for Cyprus in 1996.

In October, 1997 AMT International Mining Corporation announced the completion of a feasibility study on their Copper Creek deposits located 45 miles northeast of Tucson. The project covering 6,000 acres, includes the Old Reliable, Child Aldwinkle, and Copper Prince mines, and encompasses joint venture property with BHP and Phelps Dodge, as well as AMT-staked federal mining claims.

COAL

While Arizona is not generally known for its coal production, coal ranks second only to copper in economic importance in the State. In 1996 Arizona's coal production was 12,236,000 short tons, having an estimated value of $300 million. All production is from land leased from the Navajo and Hopi Nations by Peabody Western Coal Company. Royalties from coal production total $30 million annually. Peabody is the nation's largest coal producer and Kayenta is their largest operation.

High-quality coal is strip mined from the Kayenta and Black Mesa mines in central Navajo County. The coal is subbituminous with an average quality of 11,000 Btu, 0.5 percent sulfur, and 10 percent ash. Both mines are now using 300-ton capacity tractor trailer bottom-dump trucks to transport coal from the mine to the conveyors and pipeline feed plants.

Kayenta Mine's production capacity is 8 million tons annually. The coal from the mine is carried by a conveyor system 17 miles to storage silos. From there it is transported by the electric-powered trains of the Black Mesa & Lake Powell Railroad to the Salt River Project Navajo Generating Plant 78 miles away.

Black Mesa Mine's annual capacity is 4.5 million tons. At Black Mesa the coal is powdered and mixed with water prior to transport by the world's longest coal-slurry pipeline. The 273-mile journey to the Mohave Generating Station at Laughlin, Nevada takes 3 days.

Peabody's operations at Black Mesa are model reclamation programs. Mining and reclamation proceed at the same rate of approximately 500 acres annually. As an area is mined, the topsoil is removed and stored. After mining is completed, the topsoil is returned and the surface is contoured. The resultant reclaimed land, used for grazing, is more productive than the original land.

The U.S. Department of Interior's Board of Land Appeals has decided that Peabody's Kayenta Mine permit was properly renewed and has overturned a decision made in March, 1996 that would have shut down the mine and its supply of coal to the Salt River Project Navajo Power Plant at Page, Arizona.

GOLD

Arizona's 1996 gold production exceeded 100,000 troy ounces as the Gold Road mine in Mohave County added over 40,000 ounces to the approximately 60,000 ounces of by-product production from the copper mines.

Addwest Minerals continues to operate the underground Gold Road mine and 500 ton-per-day CIP mill at Oatman. Gold Road has about 3 years of reserves remaining that total 524,000 tons grading 0.23 ounces per ton. Addwest also holds and has been conducting exploration drilling on the nearby Moss mine that contains a 7.4 million ton resource grading 0.0338 ounces per ton. Addwest Minerals Inc.'s, parent, Addwest

Minerals International Ltd., became a publicly traded company in early 1997.

BEMA Gold, doing business in Arizona as Yarnell Mining Company, continued permitting efforts for its Yarnell deposit, Yavapai County, that contains 7.3 million tons of 0.037 oz. per ton Au. The draft Environmental Impact Statement is expected to be published by the Bureau of Land Management in December, 1997 and it is anticipated that the planned open pit heap leach operation will receive the final EIS and record of decision in mid-1998.

Nevada Pacific Mining has completed an Environmental Assessment with the Bureau of Land Management and received their Aquifer Protection Permit from the Arizona Department of Environmental Quality, but unfortunately has not yet assembled the financing to put their Cyclopic project in Mohave County into production. Although no reserve figures have been released by the privately held New Zealand company, their permits plan for a few million ton open-pit, heap leach operation.

Last year the major copper mines produced over 60,000 ounces of gold, principally from the following mines: San Manuel, Magma, Morenci, Ray, Mission, Sierrita, Bagdad, and Pinto Valley. This amount may increase significantly in the future as Phelps Dodge announced plans to reopen the New Cornelia mine. Annual by-product gold recovery is expected to be about 25,000 ounces.

INDUSTRIAL MINERALS

Although the mining of copper and its by-products accounts for 80 percent of the State's mineral production by value, mining in Arizona continues to be a diversified activity. Coal, industrial minerals, and gold largely account for the remaining 20 percent. Sand and gravel for construction aggregates, cement, and lime for chemical and construction material uses make up the majority of industrial mineral value. In 1996 Salt River Sand & Rock, located in Maricopa County, again operated the second largest sand and gravel plant in the U.S.

Other industrial minerals mined in the state are more significant in terms of their variety than their dollar value. These include limestone and marble, bentonite, diatomite, common clays, salt, cinders, smelter slag, pumice, zeolites, crushed stone, decomposed granite, perlite, gypsum, silica flux, hematite, sandstone, dimension stone, industrial sand, and mine tailings.

Calcium carbonate is mined as limestone and marble for mineral filler and as raw material for lime and cement plants. The zeolite minerals, chabazite and mordenite, are mined for processing into molecular sieves and for waste treatment. Diatomite is produced for metallurgical process insulation. Salt is crystallized by solar evaporation from brines produced by solution mining for use in food processing, livestock feed, and chemicals. Perlite is mined for processing into filter media, fillers, and carries. Quartz and quartzite is mined for use as silica flux in copper concentrate smelting. Industrial sand is produced for use as hydrafrac sand used in petroleum production. Mill tailings from a zinc mine are processed for fertilizer. Processing is done so that the contained iron pyrite can provide available iron and sulfur and so that other trace minerals in the tailings and added nitrogen can be used by plants. Bentonite is mined for out-of-state processing into desiccants and for bleaching and clarifying of edible oils.

Common clays are mined to manufacture tile, pipe, and bricks and to provide an aluminum source for the manufacture of cement. Volcanic cinders are mined for aggregates, landscaping, and road deicing. Slag from a copper smelter is processed for roofing granules and abrasives. Pumice is used for fabric treatment and light-weight aggregate. Stone is quarried and crushed for aggregates and landscaping. Decomposed granite is used for landscaping. Gypsum is mined and processed for wall board manufacture, cement manufacture, and agriculture. Hematite is mined for color and barrier pigments. Sandstone is quarried and worked for flagstone. Schist, limestone, marble, rhyolite, gneiss, and granite are quarried for decorative stone.

Acquisitions, mergers, and dissolutions have changed the corporate structure of Arizona's industrial mineral mining industry.

Omya (Pluess Staufer) of Lucern Valley, California acquired the Queen Creek Limestone deposit. The deposit supplies mine-run white marble to the Mineral Development Inc. Superior Marble crushing and screening plant in Queen Creek. Omya has announced plans to construct a marble grinding mill plant near Superior in Pinal County. Minerals Development, in agreement with Omya, will continue to supply the market with crushed and screened marble products of a particle size greater than 200 mesh.

Georgia Marble acquired the Pima Operations of Specialty Minerals at their Santa Rita Quarry in Pima County under a long-term lease and announced plans to concentrate their Arizona operations at the newly leased location.

Superior Companies has sold their mineral resource assets and closed their business. Their Camp Verde Gypsum mine was sold to Phoenix Cement Company. Their Verde Valley Sand, Gravel, and Redi Mix operation, Winkleman Gypsum, and the idle St. Johns Limestone mine were purchased by United Metro.

Pioneer Concrete of America, through its Pioneer Concrete of Arizona subsidiary, acquired Cashway Concrete and Materials in Phoenix. Cashway operates 4 concrete plants, 2 sand and gravel plants, and 85 trucks as Action Cashway. Employment at Action Cashway increased by 176 to 276 employees.

Owens Corning Fiberglass has acquired Western Fiberglass including their Eloy, Arizona fiberglass factory. The plant, which has historically used raw mineral materials imported into Arizona from other states, has expressed an interest in obtaining sources of supply within Arizona.

The Salt River Project (SRP) Navajo Power Plant at Page, Arizona began receiving limestone from Chemical Lime at a Nevada source for their newly constructed flue gas desulfurization plant. It is believed that Arizona sources were uneconomical due to restrictive highway transport regulations in Arizona.

A robust economy with an attendant high level of new residential, commercial, institutional, and industrial construction has spurred interest in developing additional sources of sand and gravel for construction aggregate.

GEMSTONES

Arizona is a leading state in the value of mined gemstones in the United States. Approximately $4 million worth of commercial gemstone production is reported for Arizona annually. Turquoise, peridot, and petrified wood account for most of the value, with amethyst, chrysocolla, azurite, malachite, and fire agate making up the remainder.

Turquoise, a hydrous phosphate of aluminum and copper, is the leading gemstone produced in Arizona. Prized for its color, turquoise is the traditional gemstone used in Southwestern Native American jewelry. It is mined as a by-product by contractors at a number of Arizona porphyry copper deposits. The best quality material is sold by the piece, and the remainder sold or processed for sale by weight. By-product turquoise is produced by Yellow Hair Trading and Mining from the Sleeping Beauty Mine at Pinto Valley and by Colbaugh Processing from the Mineral Park Mine. Although long known for their turquoise, the Morenci Mine and the deposits at Bisbee are currently yielding very little.

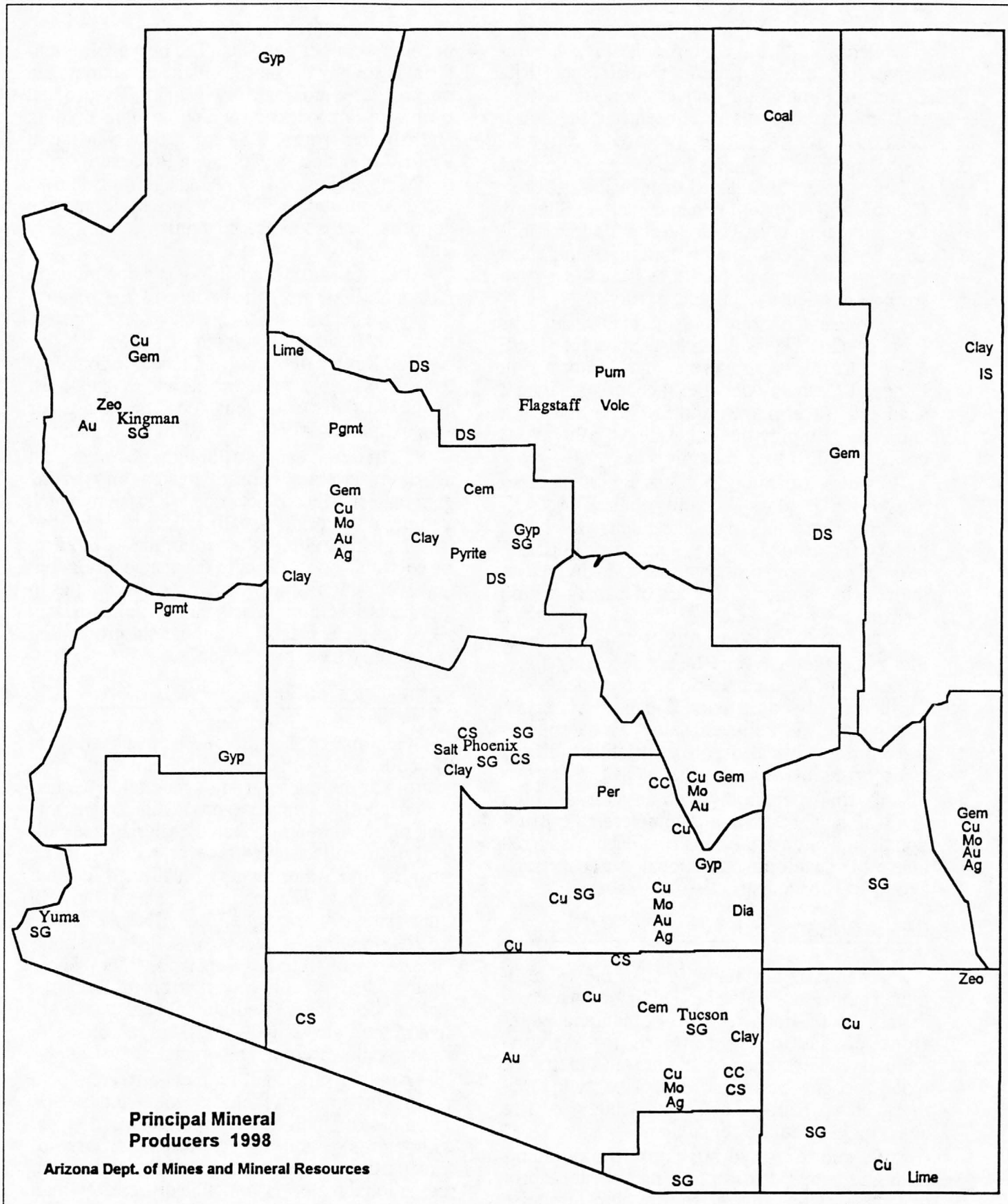
Peridot ranks second in gemstone value in Arizona. It is the gem variety of the mineral olivine. The translucent green material comes from the Peridot Mesa area of the San Carlos Apache Reservation east of Globe. Arizona material is suitable for faceting and is the finest quality in the world. This deposit accounts for approximately 90% of the world's production.

Petrified wood, although occurring in nearly every state, is best known as an Arizona gem material. Petrified wood is a fossil in which a mineral material, usually silica, has replaced the original cellular structure of the wood. Petrified wood occurs in all Arizona counties, but that occurring in Navajo and Apache counties in the Triassic Chinle Formation supplies nearly all of the gem market. Commercial production comes only from private lands.

RECREATIONAL MINING

Gem material, mineral specimens, and fossils collected by the rockhound and small contractors at the mines are not generally included in the reported gemstone production. Some portion of rockhound-collected material goes directly into collections, however, much of it and most of the other material collected is sold privately or at gem shows. The gem show in Quartzsite, for example, is the largest in the world, drawing in excess of 100,000 visitors. The prestigious Tucson Gem And Mineral Show attracts dealers and buyers from around the world. More than 25 additional gem shows are held in the state annually and 37 organized earth science clubs are currently active.

Another important segment of recreational mining in Arizona includes gold-panners and operators of small hobby-type suction dredges. Although gold is likely recovered by nearly all who participate in this form of recreation, the recreational value is undoubtedly greater than the value of gold produced. Economic data for recreational mining is difficult to quantify, but the impact on the Arizona tourism industry is significant.



Principal Mineral Producers 1998

Arizona Dept. of Mines and Mineral Resources

Ag - silver
Au - gold
CC - calcium carbonate
Cem - cement
Clay - clay

Coal - coal
CS - crushed stone
Cu - copper
DS - dimension stone
Gem - gemstones
Gyp - gypsum

IS - industrial sand
Lime - lime
Mo - molybdenum
Per - perlite
Pgmt - pigment, iron
Pum - pumice

Pyrite - pyrite
Salt - salt
SG - sand & gravel
Volc - cinders
Zeo - zeolite