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ARIZONA MINING UPDATE - 1996

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Arizona again ranked first in nonfuel mineral production in the U.S. in 1994. The value of all mineral output was \$3.62 billion, an increase of nearly 20 percent over 1993. Arizona also remains the leader in U.S. copper production, supplying 65 % of the U.S. total. Arizona's 1994 copper production was 2.6 billion pounds valued at \$2.82 billion. 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 106 active mines in Arizona producing the above commodities plus additional metals and 18 varieties of industrial minerals. There are 100 sand and gravel operations in the state. More than 17,500 people are directly employed by the mining industry.

COPPER

Copper represents about 85 percent of Arizona's non-fuel mineral value. Rising copper prices, increased sales volume, and slightly lower production costs gave the copper industry record operating earnings in 1994. The trend has continued through 1995. The price for cathode copper, averaging 88 cents in 1993, rose to \$1.07 in 1994, and averaged \$1.39 for the first 9 months of 1995.

Arimetco Incorporated

Arimetco produces cathode copper from the Johnson Camp mine, while development continues at their Van Dyke, Zonia, and Emerald Isle copper properties.

Johnson Camp, located 65 miles east of Tucson, produced 5.6 million pounds of copper in 1994, down from 7.4 million pounds in 1993 due to leach pad construction. Reserves at Johnson Camp's producing Burro Pit are estimated at over 18 million tons, while the undeveloped Copper Chief orebody contains reserves estimated at 9.6 million tons.

The Emerald Isle open pit mine and SX-EW plant located near Kingman has been on care and maintenance, but is scheduled to reopen December, 1995. Ore reserves are estimated at 2.6 million tons of 0.51 percent copper.

Premine drilling was completed at Zonia near Kirkland Junction, identifying reserves totaling 47 million tons. It is expected that all permits will be obtained in 1996 with mine development and SX-EW plant construction to follow.

Future mining plans for the Van Dyke, located underneath the town of Miami, are to inject acid into previously mined underground areas and treat recovered solutions in an SX-EW plant. The ore reserve is an estimated 110 million tons at 0.60 percent copper.

Asarco Incorporated

Asarco's Arizona operations consist of the Hayden copper smelter, two major open-pit mines, Mission and Ray, and a dump leaching/cementation operation at the Silver Bell mine. The mines' production was 508 million pounds of copper in 1994.

Asarco, along with joint venture partner Freeport, continues the in-situ leach research project at the Santa Cruz property in cooperation with the U.S. Bureau of Mines. In 1995 a test project that injects sulfuric acid into the undisturbed copper bearing formation was begun. This technology, if successful, has the potential of extracting copper from deep deposits with very little impact on the environment.

The Hayden Smelter consists of an INCO flash furnace rated at 720,000 tons of charge per year for an estimated production of 175,000 tons of blister copper.

The company's Mission complex, 18 miles south of Tucson, is a consolidation of the Mission, Eisenhower, San Xavier South, and Pima open-pit mines. The smaller but separate San Xavier North pit is also included. Sulfide ore is treated at two 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. Mission produced 225 million pounds of copper in 1994.

In 1994 Asarco began developing a 5 million ton underground deposit at Mission. Access to the orebody is through declines driven from the base level of the Mission pit. The underground operation will add about 28 million pounds of copper per year beginning in mid-1996.

The Ray mine consists of an open-pit mine, two mills - a concentrator at Hayden and a recently commissioned 30,000 ton per day concentrator at Ray, dump and heap leach operations, and a 40,000 ton per year SX-EW plant at Ray. A 15-month accelerated development program has been completed and production is at full capacity. The Ray mine is in an elite group of three deposits in the U.S. with reserves in excess of 1 billion tons.

Asarco's Silver Bell mine produces copper by dump leach precipitation. The open-pit mine and mill remain on stand-by status. The company received permits in 1994 for a new SX-EW plant that when completed is expected to produce 18,000 tons of refined cathode copper annually at substantially lower cost. Oxide ore is expected to come from a new area of the property known as Silver Bell North.

Cambior U.S.A.

Carlota Copper Company, a subsidiary of Cambior U.S.A., continues environmental permitting for its Carlota project near Globe. It is anticipated the final Environmental Impact Statement from Tonto National Forest will be received by January 1996 and construction started by mid-year. The property consists of four oxide ore bodies, Carlota, Cactus, and North and South Eder. Minalable reserves total 96 million tons grading 0.44 percent copper. Production is planned at a rate of 30,000 tons of copper per year for the first ten years via open pit mining, heap leaching and SX-EW.

Cyprus Climax Metals Company

Cyprus is Arizona's second largest producer of copper and the world's largest producer of molybdenum. Copper totals for 1994 were 601 million pounds of copper with an estimate of 675 million pounds for 1995. Cyprus Climax Minerals Company maintains corporate headquarters in Tempe, Arizona and operates five copper producing operations in the State: Bagdad, Tohono, Miami, Mineral Park, and Sierrita.

The Sierrita property consists of three open-pit copper-molybdenum mines, a 110,000 ton per day concentrator, two molybdenum roasting plants, a ferromolybdenum plant, a rhenium plant, a dump leaching operation, and an SX-EW plant. More than three quarters of Cyprus' molybdenum concentrate from Thompson Creek (Idaho), Bagdad, and Sierrita is processed at Sierrita through roasters to

MINERAL PRODUCTION IN ARIZONA - 1994

COMMODITY	QUANTITY	VALUE
Clay (tons)	101,000	\$421,000
Copper (tons)	1,254,000	2,820,000,000
Gemstones		3,780,000
Gold (troy ounces)	80,000	28,900,000
Sand & gravel(tons)	49,600,000	185,000,000
Silver (troy ounces)	5,470,000	23,500,000
Stone-crushed(tons)	7,280,000	38,300,000
Pigments (tons)	75	38,000
Coal (tons)	12,901,000	300,000,000
Other ²		225,000,000
TOTAL		\$3,625,000,000

1/ Nonfuel figures from U.S. Bureau of Mines.

2/ Cement, clays (bentonite), gypsum, lime, molybdenum, perlite, pumice, pyrites, salt, sand & gravel (industrial), dimension stone, lead.

produce molybdenum oxide and ferromolybdenum. Sierrita is recognized as one of the most efficient mines in the world as it operates with the lowest copper grade, 0.28 percent, of any milling operation.

The Bagdad operation consists of an open-pit copper-molybdenum mine, a 85,000 ton per day concentrator, a dump leach operation, and a SX-EW plant. In 1994 Bagdad produced 31 million pounds, or 15 percent of its total copper production, as electrowon copper cathode. Bagdad has a billion ton proven and probable ore reserve of 0.38 percent copper and 0.028 percent molybdenum.

Cyprus has entered an agreement with the Tohono O'Odham Nation to develop a 600 million ton resource at Casa Grande. The Bureau of Land Management has approved the final environmental impact statement for the project. The Tohono operation consists of an open pit, copper heap leach, and SX-EW plant. In 1994 Tohono produced 24 million pounds of copper.

The Miami mine consists of an open pit copper mine, an SX-EW plant, a smelter recently expanded to a capacity of 650,000 tons per year, an acid plant, a new 380 million pound electrolytic refinery, and a 135,000 ton per year rod

plant. Miami produced 119 million pounds of copper in 1994 and has increased the capacity of its SX-EW plant to increase production in 1995. The investments in the smelter and refinery at Miami have made Cyprus, not only more efficient, but also self sufficient in domestic copper smelting and refining.

At the Mineral Park open-pit copper-molybdenum mine in Mohave County, Cyprus converted the in-place leach and precipitate operation to an SX-EW operation capable of producing 6 to 8 million pounds of copper per annum. A research project studying the feasibility of in-situ leaching a fracture hosted chalcocite deposit at Mineral Park is underway.

Magma Copper Company

San Manuel, Pinto Valley, and Superior are Magma Copper company's three mining divisions in Arizona. Magma Copper Company's corporate headquarters are located at Tucson. Magma holds additional, undeveloped reserves at the Poston Butte and Copper Creek deposits. Magma acquired the Poston Butte deposit at Florence from Conoco in 1992. It completed a 17-month prefeasibility study to evaluate the deposit as an in-situ leach operation in 1994. Magma has initiated the permitting and feasibility study process.

The underground mine at San Manuel is the largest underground operation in the United States and the largest underground copper mine in the world. San Manuel produced 215 million pounds of copper in 1994. The San Manuel Division consists of a block-caving underground copper mine, a 62,000 ton per day concentrator, heap leach, in-situ leach, 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. Development of the downfaulted Kalamazoo ore body at San Manuel is continuing. Its estimated ore reserves of 2.1 billion pounds contained copper will add twelve years to the San Manuel underground mine. Production is planned to be phased in with the depletion of the San Manuel orebody over the period from 1997 through 1999.

Magma's San Manuel smelter accounts for about 25 percent of U.S. copper smelting capacity. The Outokumpu flash smelting furnace was the largest single furnace smelter in the industry and a 20 percent expansion of its capacity was completed in March, 1994.

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 old Miami tailings. The resulting pregnant leach solutions are processed through Miami's 10,000 ton per year SX-EW plant. Pinto Valley produced 199 million pounds of copper in 1994.

The Superior division consists of the company's namesake, the Magma underground mine. This mine overcomes the difficult mining challenges of being hot, wet, and deep. That it remains in production is credited to its high grade ore, averaging 5.53% copper in 1994, ten times the average content of Arizona copper ore. Magma produced 41 million pounds of copper in 1994, but is slated for closure in 1996.

Oracle Ridge Mining Partners

The Oracle Ridge Mining Partnership consists of Santa Catalina Mining Corp., (formerly South Atlantic Ventures Ltd.) who hold a 70% interest and operate the mine, and Continental Materials holding the remaining 30%. The underground Oracle Ridge mine produced concentrates containing 5.2 million pounds of copper in 1993. The company is planning to expand production to 1 million pounds per month.

Phelps Dodge Corporation

Phelps Dodge Corporation, headquartered in Phoenix, is the nation's largest copper producer and 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 new copper at its mines in southeastern Arizona and southwestern New Mexico. In Arizona Phelps Dodge holds the Copper Queen Mine in Bisbee and the Morenci in Greenlee County. Morenci is the largest copper producer in North America and the second largest copper mine in the world. In 1994, Morenci produced a record 407,400 tons of copper! Phelps Dodge owns an 85 percent undivided interest in the Morenci Mine; the remaining 15 percent is owned by Sumitomo Metal Mining Company, Ltd. Morenci employs more than 2,000 people.

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, three dump leaches with SX plants and at a capacity of 340 million pounds annually, the worlds largest EW plant. A \$200 million expansion to the SX-EW facility was completed in 1994. The Southside deposit adjacent to the Morenci pit, with reserves estimated at 150 million tons, is scheduled to go into production in late 1995. It will produce an additional 130 million pounds of high-grade copper per year.

The feasibility of adding a fourth open pit, Coronado, to the mining operation is under way. It hosts 480 million tons of sulfide and oxide ore. The near-by Western Copper deposit is estimated to contain 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. In 1994, part of a large resource of leachable material, containing 760 million tons grading 0.28 percent copper, was outlined north of the Morenci mine in an area called Garfield. Drilling to define the rest of this deposit was continued.

The company's Copper Queen mine consists of a dump leaching and precipitation operation at the depleted Lavender pit. No decision has been made as to when to bring the adjacent Cochise deposit to production.

Phelps Dodge has opened an office in Safford where evaluation of the Lone Star, Dos Pobres, and San Juan deposits continues. Recent drilling at these deposits has increased identified resources to nearly 2 billion tons of open pitable material that could be recovered by heap leach SX-EW operations. Work is also underway on a land exchange to facilitate development in the district.

At San Juan 170,000 feet of reverse circulation drilling and core drilling in 152 holes was completed and an option to acquire the property was exercised in September of 1994. In May 1995, negotiations were begun to purchase the Sanchez property near Safford from Azco Mining Company. The acquisition of Sanchez would add 200 million tons of copper reserves and complete Phelps Dodge's land position in the district. A final decision is pending approval by Azco.

The New Cornelia mine at Ajo remains inactive. The ore reserves there are 160 million tons grading 0.56 percent copper.

COAL

Coal is a distant second to copper in economic importance of mineral commodities produced in the State. In 1994 Arizona's coal production was 12,901,000 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. Here, 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 about three 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.

GOLD

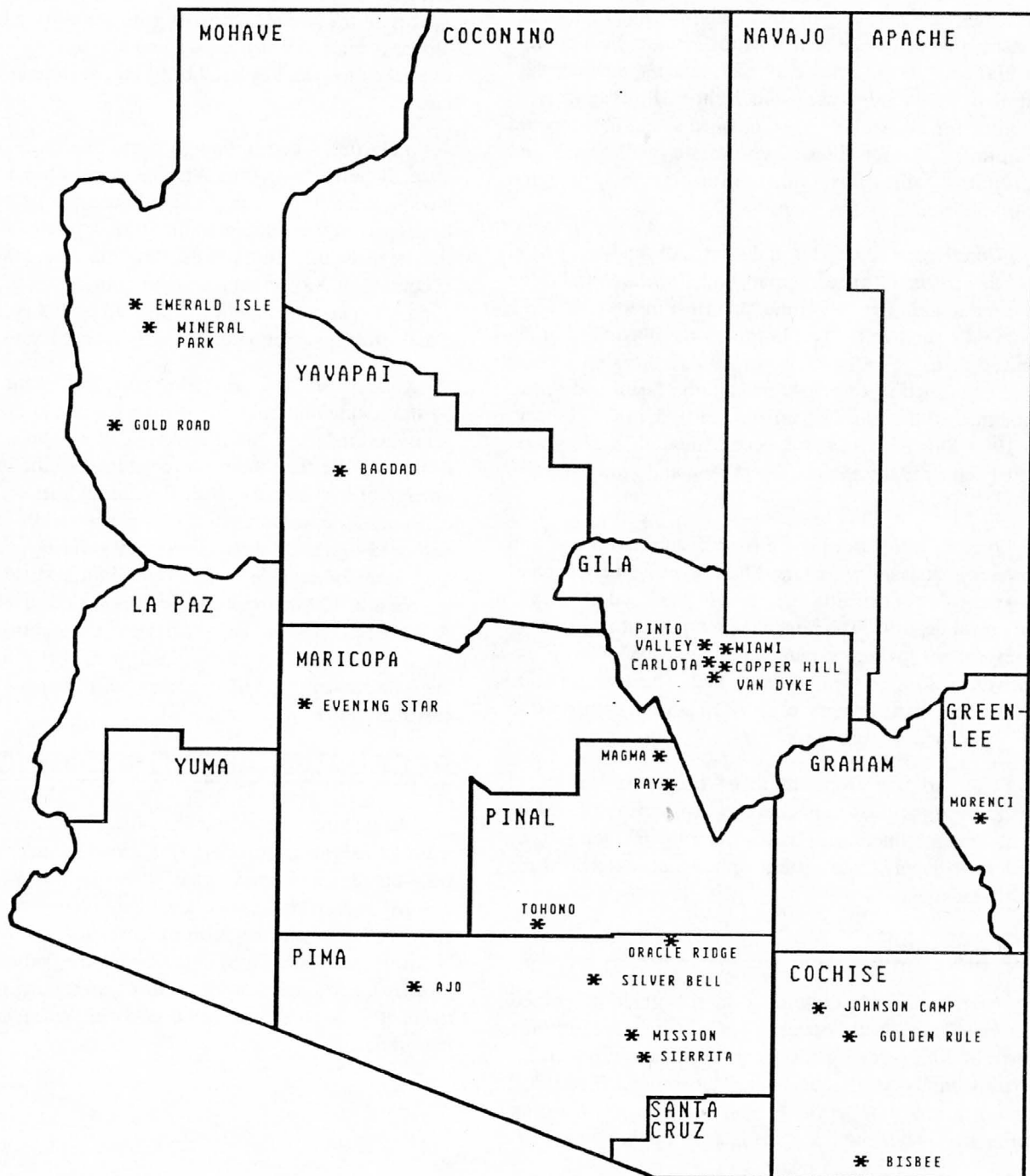
In December of 1994 Addwest Minerals Inc. reopened the Gold Road mine in the historic Oatman mining district following construction of a 500 ton per day mill. During 1995 the company announced plans to sell this project and their other gold holdings. Production continues while the property remains on the market.

The Gold Prince mine in the Dos Cabezas Mountains continued to produce gold-bearing silica flux supplying Phelps Dodge's Hidalgo Smelter in Playas, New Mexico. Western States Minerals replaced the mining contractor with its own staff during 1995.

Two new gold operations are added to this year's active mines list. Cochise Resources is operating the Golden Rule in Cochise County with a small gravity and flotation mill producing a gold, lead, and silver concentrate. Gold Chord Inc. has nearly finished development at the Evening Star mine located in western Maricopa County. Shipments of gold and copper bearing silica flux should begin in the spring of 1996.

Gold continues to be produced as a by-product of the copper industry in Arizona. Last year the major copper mines produced approximately 60,000 ounces of gold from the following mines: San Manuel, Magma, Morenci, Ray, Mission, Sierrita, Pinto Valley, and Oracle Ridge.

ARIZONA METAL MINES



INDUSTRIAL MINERALS

Although copper accounts for three-fourths of the State's mineral production by value, mining in Arizona continues to be a diversified activity. Industrial minerals mined in the state last year include calcium carbonate as limestone and marble for mineral filler and as raw material for lime and cement plants, bentonite for desiccants and for bleaching and clarifying of edible oils, sand and gravel for construction aggregate, diatomite for metallurgical process insulation, tile and brick clay, salt, cinders, smelter slag, pumice for laundry uses and light-weight aggregate, zeolites for molecular sieves, crushed stone, decomposed granite, perlite for filters, gypsum for wall board and agriculture, silica flux, hematite for pigments, quarried flagstone, and hydrafrac sand.

Construction aggregates in the form of sand and gravel lead this industrial mineral group, both in volume and value of production. For 1994 and the first quarter of 1995 Arizona's sand and gravel production ranked third in the United States. For the same period Arizona's position in total construction aggregate production (sand and gravel combined with crushed stone) was eleventh in the country. In 1994 Salt River Sand & Rock located in Maricopa County operated the second largest sand and gravel plant in the U.S.

Arizona is fortunate to have large quantities of sand and gravel near consuming centers. Slightly over ninety percent of Arizona's construction aggregate is produced from sand and gravel deposits. The remaining ten percent is produced from quarries where it must be drilled, loaded with explosives, blasted, crushed, and screened. The average value of Arizona's sand and gravel is \$4.10 per ton compared to \$5.80 per ton for crushed rock.

The Arizona Department of Mines and Mineral Resources continues to encourage exploration, development, and production of industrial mineral deposits in Arizona to supply southwestern United States and northern Mexico markets.

GEMSTONES

Arizona is a leading state in the value of mined gemstones in the United States. Approximately \$3.7 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 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.

Peridot 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. Occurring in Quaternary basalt, the olivine is mined by shallow drilling and blasting of productive zones followed by hand breaking, screening, and sorting.

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.

Gem material, mineral specimens, and fossils collected by the rockhound hobbyist is not included in the reported gemstone production, but it is likely that rockhound production is higher than the reported mine production. Some portion of rockhound-collected material goes directly into collections, however much of it is processed by lapidaries, and 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 visitors and dealers from around the world. More than 20 additional gem shows are held in the state annually and 61 organized earth science clubs are currently active.

RECREATIONAL PROSPECTING

An important segment of the Arizona mineral industry is that of recreational mining. This group includes primarily gold-panners and operators of small hobby-type suction dredges. Although some gold is likely recovered by nearly all who participate in this form of recreation, the recreational value nearly always out weighs the value of gold produced. Economic data for recreational mining is difficult to quantify, but the impact on the Arizona tourism industry is significant.