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Inco

Lac properties

November 7, 1994

The Northern Miner

2

Inco

GMV = $3.39 \times 7 \text{ million tones} = 24.7 \text{ million tones}

Lac properties

November 7, 1994

The Northern Miner

2
recovered in the Sierrita concentrator from copper ore extracted at Cyprus' Twin Buttes Mine. Molybdenum output at the Twin Buttes property was reported separately by the company for 1988, the year when operations began at the mine; in that year, 36.7 metric tons (81,000 pounds) was produced.7

The second largest producer of molybdenum in Arizona was the Cyprus-owned Bagdad Mine in Yavapai County. Output at the mine was 3,950 metric tons (8.7 million pounds), according to the company's 1989 Form 10-K. Other properties that produced molybdenum were the Pinto Valley and San Manuel Mines owned by Magma and the Morenci Mine owned by Phelps Dodge. Production at each of these mines, respectively, was 575 metric tons (1.3 million pounds), 1,380 metric tons (3 million pounds), and 860 metric tons (1.9 million pounds).

Silver.—Arizona was ranked fifth in the United States in silver output in 1989. Production increased more than 12% over that of the previous year to about 171 metric tons (5.5 million troy ounces). This quantity was more than 8% of total domestic production of silver.

Five mines in the State were among the 25 leading silver operations in the Nation. These mines plus two others, all primary copper producers, were responsible for nearly 97% of Arizona's output. Cyprus' Sierrita Mine, including the Twin Buttes property, was the largest producer of byproduct silver. Asarco's Mission Complex, ranking second, produced 42.4 metric tons (1,362,000 troy ounces) according to the company's 1989 annual report. Production of silver at Asarco's Ray Mine was reported to be 13.7 metric tons (439,000 troy ounces). Magma stated in its 1989 annual report that the combined output of the Pinto Valley and San Manuel divisions was about 44.9 metric tons (1,445,000 troy ounces), with San Manuel contributing more than 60% of the total. Phelps Dodge's Morenci Mine and Cyprus' Bagdad Mine were large producers of byproduct silver.

Approximately two-thirds of the remaining silver production in the State was derived from siliceous ores shipped to copper smelters. The largest of these producers was the underground Ash Peak Mine operated by Arizona Flux Mines Inc. in Greenlee County. Other major sources of silver-bearing flux were the Commonwealth tailings in Cochise County and the Mammoth tailings and the Reyment lode mine in Pinal County. According to the 1989 annual report of the Plexus Resources Corp., the Reyment Mine produced 5.2 metric tons (167,000 troy ounces) of silver during the fiscal year that ended June 30. Plexus held a royalty interest in the mine, which was operated by Triple Nickel Inc. for Cyprus Minerals.

PBR Minerals Inc. began to heap leach precious-metal-bearing materials at its Grand Central property in Tombstone (Cochise County) in 1989.8 The company initially treated ore that had been previously crushed, agglomerated, and leached by Tombstone Exploration Inc., which closed its operation in mid-1984. PBR expended about $2.5 million to bring the property into production. During the year, the company produced 1.85 metric tons (59,604 troy ounces) of silver and 28.2 kilograms (907 troy ounces) of gold.

Other Metals.—Arizona was the only State in which rhenium was recovered in 1989. It was produced by Cyprus at the Sierrita Mine. The metal, occurring as a trace element in molybdenum, was recovered as ammonium perrhenate by roasting molybdenum concentrates.

Approximately 15% of the Nation's domestically produced uranium was mined in Arizona. In 1989, six uranium mines in Arizona, in Coconino and Mohave Counties, were either in production or under development by Energy Fuels Nuclear Inc.

A relatively small amount of lead was produced as a byproduct at the Mission copper complex, and lode tin was recovered at the Cheops property in Graham County. There was no recorded production of other metals during the year in the State except trace metals recovered at copper refineries.

Industrial Minerals

Cement.—Arizona ranked in the top half of all cement-producing States during the year. Output, however, of masonry cement has continued to decline since 1987, and, in 1989, was about 20% less than that of the previous year. The production of portland cement decreased 5% from that of 1988. Compared with the previous year, the average price in 1989 increased about 6% for masonry cement and decreased about 1% for portland cement.

Arizona Portland Cement Co., a subsidiary of the Calmat Co., was the largest producer of cement in the State. According to Calmat's 1989 Form 10-K, its Rillito plant in Pima County has an annual production capacity of 900,000 short tons of clinker. During the year, the company completed the installation of a roll press and high-efficiency separator at the facility. The company continued to reduce fuel costs by burning rubber tire chips in kilns at the cement plant.

Southwestern Sunbelt Cement, a subsidiary of Southdown Inc., began construction during early 1989 of a $2.5 million cement distribution terminal in Casa Grande (Pinal County). At the time of construction, the new terminal was jointly owned by Southdown and Cementos Mexicanos SA, which was the largest producer of cement in Mexico. The terminal will receive cement imported from Mexico.

After dissolving its association with Cementos Mexicanos, however, Southdown initiated and led six other U.S. cement producers in Arizona, Florida, New Mexico, and Texas in the filing of an antidumping petition against Mexican cement producers. The petition, filed in September 1989 with the International Trade Commission (ITC), alleged that cement from Mexico was being sold in these States at less than fair-market value. By yearend, the ITC issued a preliminary determination that there was a reasonable indication of material injury to the domestic producers. A final ruling was to be issued in 1990.

Clays.—In 1989, production of all clays increased almost 12% over that of the previous year. The output of common clay and shale rose about 6% to 151,400 metric tons (166,800 short tons) and that of bentonite increased sharply by more than 41% to 36,900 metric tons (40,600 short tons). Most of the bentonite produced in Arizona was the low-swelling calcium variety.

Gem Stones.—Arizona slipped from third to fourth place nationally in the value of production of gem stones. The State ranked second in the Nation, however, as a source of inorganically derived gem materials. Arizona produced a greater variety of gem stones than any other State. Output included agate, amethyst, antlerite, azurite, chrysocolla, garnet, jade, malachite, obsidian, onyx, opal, peridot, petrified wood, shattuckite, smithsonite, and turquoise.
Structural Regional Studies along the Carlin Trend and in the Central Betze Orebody, Goldstrike Mine

by

Stephen G. Peters (U.S. Geological Survey, Reno Field Office, Mackay School of Mines, University of Nevada, Reno, Nevada 89557-0047)

Abstract

1). Two structural domains are present in the area of the Carlin trend area: **Domain I**, an area of NE-SW-trending, shallow-plunging axial planes, mostly in the Orodivian Vinini Formation; and, **Domain II**, a narrow NW-trending zone which contains mainly NNW-SSE-trending, shallow-plunging fold axes—mainly involving "lower plate" rocks, but also some upper plate rocks of the Roberts Mountain allochthon.

2). A consistent structural grain is present within the Carlin trend. The **linear fabric** is defined by the NNW-SSE-trending fold axes. The **planar fabric** is a NW-striking, 30 deg., NE-dipping zone, which contains both the NNE-trending, older axes and has rotated them to the west. This plane is the axial plane to all folds along the Carlin trend. Many steep-dipping, brittle faults along the Carlin trend, such as the Post Fault, contain the plunge of the NNW fold axes, which are co-planar with the fold axes. NE-trending brittle faults are commonly coplanar with the older NE-SW axes.

3). The Central Betze orebody is hosted within the Dillon deformation zone, which cross cuts the nose of the Betze syncline, and strikes parallel to much of the Devonian Popovich-granodiorite contact. The orebody is also hosted within the Betze anticline, which may have formed as the result of shear folding along the Dillon deformation zone.

4). At least six separate ore types are defined within the Central Betze orebody, based on geologic setting, mineralogy, geochemistry and morphology. The ore types are partitioned spatially within the orebody in discrete oreshoots, which have demonstrable spatial relationships to the Popovich-Devonian(?) Rodeo Creek and Popovich-granodiorite contacts and the Dillon deformation zone. The oreshoots are zoned from the footwall to the hangingwall of the orebody, with pyrite ores on the outside (top), arsenic ores in the center, and antimony ores at the bottom.
To: Jim Briscoe  
Company: James A. Briscoe & Assoc.  
FAX: (602) 298-6688  
Date: June 27, 1994

From: Lyle Slater  
Pages: 2 (including cover page)  
Topic: Tombstone

Message:

Dear Jim,

Attached is the price sheet previously sent to you.

The original mapping photo used in Tombstone was 1:12500. From this photo, your horizontal and vertical error should fall just under one foot.

Thanks!

If you do not receive all pages, please call and advise.

Tel: 602-798-1323  
FAX: 602-798-1569
## TOMBSTONE ESTIMATE BREAKDOWN

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**TOPOGRAPHICAL MAPPING**

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| SECTION 27                                | $1,498.00                  |
| SECTION 28                                | $1,373.00                  |
| SECTION 29                                | $1,498.00                  |
| SECTION 33                                | $1,249.00                  |
| SECTION 34                                | $1,373.00                  |
| SECTION 35                                | $1,249.00                  |

**SECTIONS DONE INDIVIDUALLY**

$9,613.00

**ALL SECTIONS - SAME TIME**

$6,142.00

**TOTAL COSTS**

$15,389.00

$11,918.00

$3,471.00

The Orthoshop-Tucson