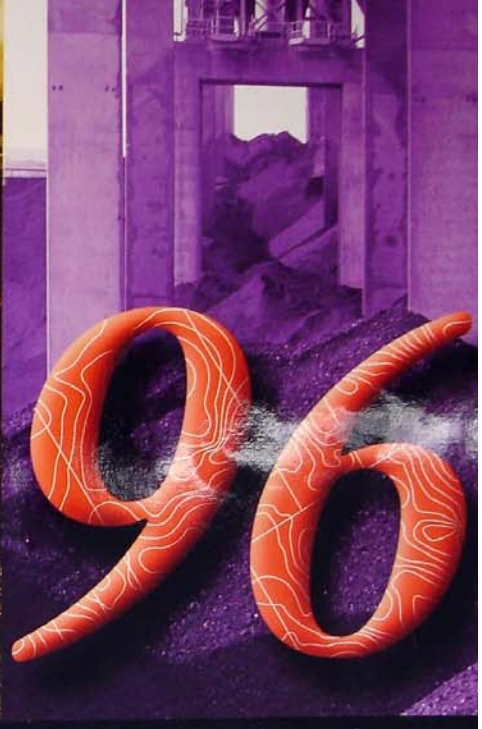
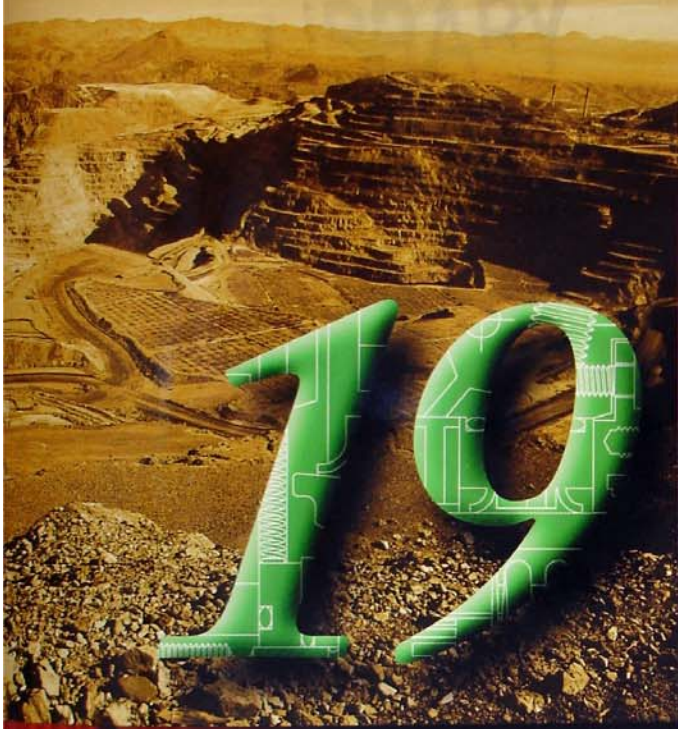


Mining

ENGINEERING
A PUBLICATION OF SME

MAY 1997



Annual Review



er
N
1585

rotary diamond pans, each 4.2-m- (14-ft-) diam, that concentrate the diamonds. The diamond-bearing concentrate and water are passed over a vibrating grease table where diamond recovery takes place.

More than 60% of the diamonds recovered at Kelsey Lake are of gem quality. This includes a 28.3-carat light yellow diamond. This is the largest diamond

company planned continued exploration in 1997. ■

IDAHO

V.S. GILLERMAN, Idaho Geological Survey

Idaho gold mines produced a record of 10.8 t (347,47 oz) of gold during 1996. This surpassed the 9.3 t (300,000 oz) reported in 1995.

Meridian Gold's new Beartrack Mine in Lemhi County produced 3.4 t (108,630 oz). The company changed its name back from FMC Gold after it was spun off earlier in the year.

Pegasus Gold's Black Pine Mine produced more than 2.7 t (87,000 oz). The company continued mining the C/D pit and the NE Tolman pit.

Hecla Mining's Grouse Creek mine recovered more than 2.3 t (76,000 oz) of gold. The company also announced that it will shut down the mine in 1997 after mining the Sunbeam Pit. Kinross Gold mined gold and silver from the DeLamar Mine and the newly opened Stone Cabin Mine in Owyhee County.

Seasonal operations continued at Dakota Mining's Stibnite property in Valley County, US Antimony's Yellowjacket Mine in Lemhi County and CSC Mining's Rescue Mine in Warren. Thompson Creek Mining was at full production at its Thompson Creek molybdenum mine near Challis.

Exploration projects (Fig. 1) in Idaho were principally targeting precious metals. However, cobalt, base metals and phosphate also attracted interest.

Coeur d'Alene district and north Idaho

Mining and exploration work in the Silver Valley was encouraged by good lead prices and moderate silver prices. Sunshine Mining and Refining operated its Sunshine Mine all year. The company planned to double production and add 60 miners as a result of the West Chance discovery.

Hecla Mining mined silver and lead at the Lucky Friday Mine. The company drilled from the new 4900 level drift of the Lucky Friday out to the Gold Hunter exploration project, located 1,220 m (4000 ft) north. Vein intercepts were high grade 720 g/t (21 oz/st) and metallurgy was good. Hecla estimated potential for as much as a 1.5-kt (50-million oz) silver resource. The expansion project is located below the workings of the old Gold Hunter silver-lead mine.

Silver Valley Resources is a joint venture between Ararco and Coeur d'Alene Mines. It performed exploration work at the Galena Mine, which it hopes to re-open soon. New computer-aided exploration models have resulted in the discovery of several new ore zones.

Cyprus Amax and ICMC formed a joint venture for work on the Petzite property in the Orogrande Shear Zone west of Elk City. Cyprus Amax conducted a soil-sampling program and drilled 16 reverse-circulation holes. One hole intersected a thick mineralized interval from 32 to 150 m (105 to 500 ft) grading 0.7 g/t (0.02 oz/st) gold.

Salmon area

Meridian Gold operated the Beartrack heap-leach gold project at Leesburg in Lemhi County. The first year of full production yielded 3.4 t (108,630 oz). Company geologists drilled more than 12,190 m (40,000 ft) to explore and delineate reserves between the North and South pits along the Panther Creek Fault.

International Gold Resources, the parent company of American Gold Resources (AGR), was bought by Ashanti Goldfields, an African gold-mining company. US properties include the Ditch Creek deposit and Arnett Creek project. These were up for sale. AGR's work had outlined a reserve of 18.6 t (600,000 oz) of gold

Exploration activity in Idaho during 1996.



in sheared phyllites and intrusives at Ditch Creek.

Cominco American pursued base metal targets in the Proterozoic sediments of the Salmon region. The company drilled a core hole at the Iron Creek copper-cobalt show and also at the nearby Twin Peaks property.

Formation Capital had one of the larger efforts in the state at its Sunshine project in the Blackbird Mining district. The target was syngenetic cobalt-copper-gold mineralization, similar to the adjoining Blackbird Mine. Cobalt spot prices reached more than \$20/lb in late fall. This kept the Formation crews hopeful.

Formation's 1995 drilling included 67 holes for 9,980 m (32,745 ft) of core on the Sunshine project and compilation of the large volume of historic mine information. Those results outlined a reserve of 134 kt (147,700 st), grading 0.9% cobalt, 0.5% copper and 0.8 g/t (0.023 oz/st) gold. There is also a potential resource of 453 kt (500,000 st) on the Sunshine property.

The 1996 program included 6,400 m (21,000 ft) of phase one core drilling on the Sunshine zone (six holes), East Sunshine (20 holes) and Northfield (three holes) target zones.

West central Idaho

USMX filed a notice-of-intent to operate with federal and state agencies to permit a seasonal, heap-leach.

open-pit gold mine at the Dewey Mine property in the Thunder Mountain district east of Stibnite in Valley County. Plans call for processing 4.8 Mt (5.3 million st) for six years. Production would be about 1.2 t/a (40,000 oz/year) and 2.4 t/a (80,000 oz/year) of silver. Processing facilities would be located on the flat, reclaimed ridgetop used by Coeur d'Alene Mines for its Sunnyside and Lightning Peak mines, which operated from 1981 to 1990.

Dakota Mining, operator at the Stibnite Mine, and Hecla Mining signed a letter of intent to develop a refractory sulfide gold deposit in the Stibnite district. The resource contains about 18 Mt (20 million st) grading 3.1 g/t (0.09 oz/st) gold for 55.9 t (1.8 million oz). Dakota operates an oxide heap leach at Stibnite and recovers about 933 kg/a (30,000 oz/year).

Dakota continued permitting on five additional targets in the Stibnite district. The Cinnamid deposit was trenched, mapped and sampled. Company geologists implemented a fall program with 9,145 m (30,000 ft) of core and reverse-circulation drilling on the Broken Hill deposit and other targets.

East central and south central Idaho

Curator American intersected stratabound zinc mineralization in one of its six 1995 drill holes on the DSA property near Bear Peak off the North Fork of the Big Lost River in Custer County. The mineralization is part of a Paleozoic black shale basin. Exploration in the area began in 1981. However, difficult logistics and objections of a local environmental group finally scuttled the project. Curator reclaimed the drill sites and roads and dropped the claims.

Cambior Exploration's Sultana project is located outside of Mackay in Custer County. Cambior acquired the ground in 1994 and conducted surface work in 1995. Drilling with two core rigs offered encouraging results. Some 22 holes were completed. Oxidized skarn with copper-iron-gold mineralization surrounds a granite porphyry at the of Empire copper mine. The lengthy skarn zone is located on 95% private ground in the White Knob Mountains. Drill intercepts were in the range of 0.5% copper over several meters with significant gold credits. Cambior planned to restart drilling early in the spring.

Ownership of the Atlanta project in Elmore County changed hands again when Quest International Resources took over Ramrod Gold. Quest plans to conduct a feasibility study on mining the 31-t (1-million oz) gold and 77.7-t (2.5-million oz) silver resource outlined on 10.8 km² (2,678 acres) near Atlanta northeast of Boise.

Quest was working on the feasibility and deciding on a possible mine scenario during the second half of 1996. Some type of open-pit, heap-leach scenario is envisioned.

Boise Basin and southern Idaho

Cactus West maintained its claims on the Cumo molybdenum property on upper Grimes Creek in the Boise Basin. The large low-grade molybdenum deposit was discovered and drilled by Amax in the 1970s.

In southwestern Idaho, Golconda explored the VAR claims at the Consolidated Mercury prospect in Washington County. Precious-metal mineralization is hot-springs related. The company drilled 1,830 m (6,000 ft)

of reverse-circulation holes. Results enlarged the zone of gold mineralization and encountered some high-grade intervals.

In Owyhee County, Kinross Gold was shifting production from the DeLamar Mine, which started open pit operations in 1977, to the new Stone Cabin Mine opened in late 1995. Gold and silver ore from the new operation is trucked 11 km (7 miles) west to the DeLamar counter current, vat-leach mill.

A Knelson centrifugal concentrator was installed into the mill's grinding circuit to aid gold recovery from the Stone Cabin ores. Two pits, the Tip Top and Stone Cabin, were in operation during 1996. This was the first full year of a planned seven-year mine life. Kinross' operations contributed more than 1.2 t (40,000 oz) to Idaho's gold production during 1996.

On Idaho's eastern side, a major company drilled for base metals in Butte County. And Echo Bay Exploration had another active year drilling on the Kilgore project in Clark County. The young, epithermal precious-metal system was initially drilled by Bear Creek in 1983. Echo Bay formed a joint venture with Placer Dome in 1994.

Since Echo Bay took over the Kilgore project two years ago, it has drilled 110 holes with no new roads built. Drilling during 1995 totaled 9,450 m (31,000 ft) of core and reverse-circulation. Phase three drilling took place from January to September 1996. It involved 4,875 m (16,000 ft) of core drilling and 3,350 m (11,000 ft) of reverse-circulation rotary drilling.

Industrial minerals

The phosphate industry is the largest mineral industry in Idaho. Most activity is located in southern Idaho. The four Idaho phosphate mines include FMC's Dry Valley Mine, Simplot's Smoky Canyon Mine, Rhone-Poulenc's Rasmussen Ridge Mine and Monsanto's Enoch Valley Mine. Together, these operations extracted more than 5.9 Mt/a (6.5 million stpy) of ore.

The value of the ore and processing, conducted at Soda Springs and Pocatello, was estimated at more than \$660 million for 1995. This contributed to Idaho's \$1 billion in mineral production.

Mines and plants operated at full capacity. These included Kerr-McGee's vanadium extraction plant and Agrium's fertilizer plant, which processes ore mined by Rhone Poulenc.

Aggregate demand continued strong due to an active construction industry fueled by rapid growth in urban areas. Cement and dimension stone quarries also saw an increase in sales.

In Malad, Hess Pumice opened a second grinding plant. It is designed exclusively for the company's special low heavy mineral, fine pumice used for polishing television screens. Products from the new \$3-million facility are exported to many countries.

Also in Malad, Oglebay-Norton's National Perlite Products plant and mine was bought by Idaho Minerals, a subsidiary of Moneta Porcupine Mines, of Timmins, Ontario. Idaho Minerals planned a new, facility near Virginia for better access to rail transport.

In Valley County, Golconda retained an interest in the state's only diamond exploration project. The company collected some bulk samples of the bedded fragments at the project site near McCall. ■