

MAY 1996

Mining

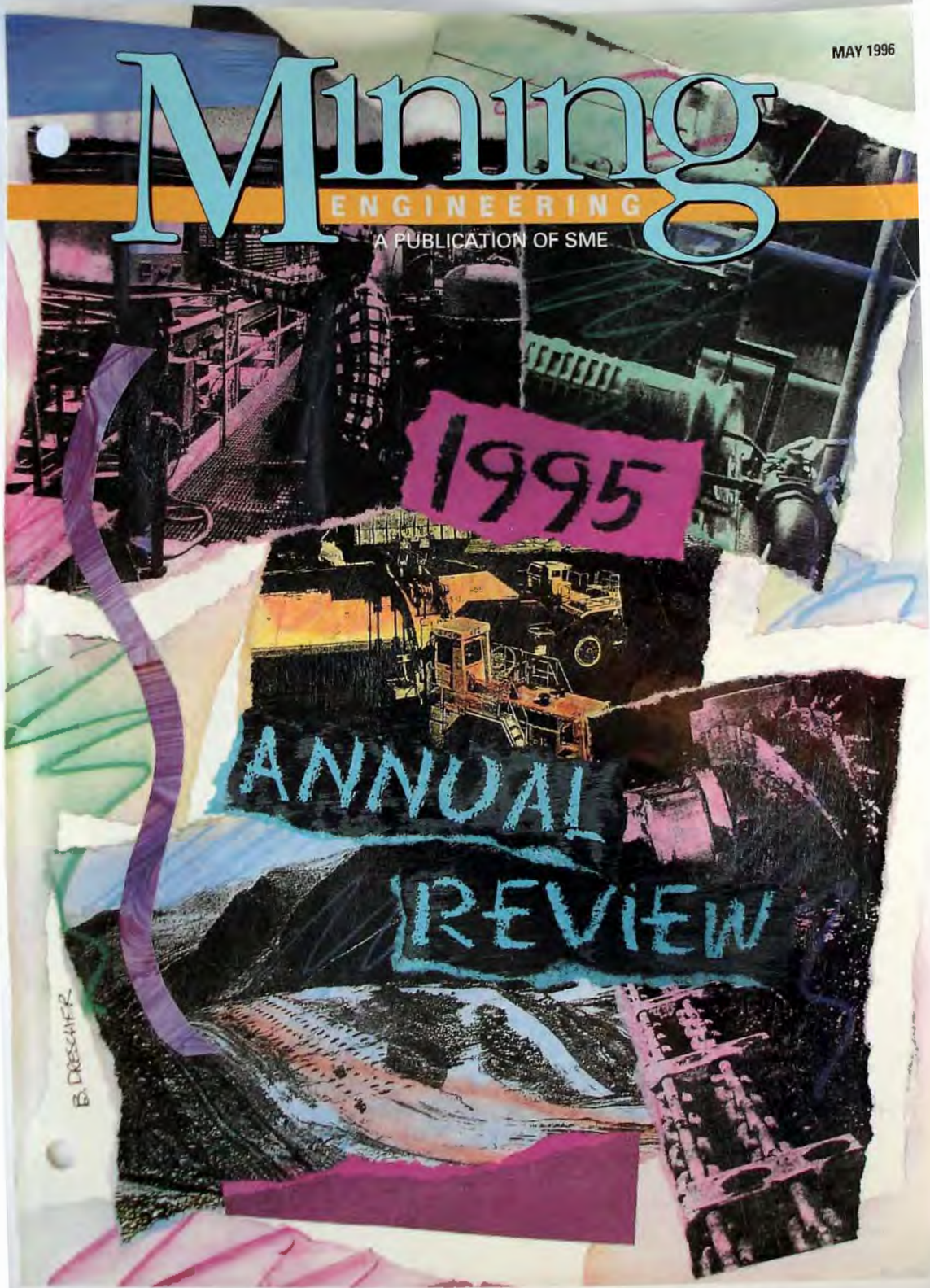
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B. DRESCHER



trial mining program. The diamonds produced at the Kelsey Lake Mine will be marketed as Colorado Diamonds and Kelsey Lake Diamonds.

More than 60% of the diamonds recovered in previous bulk sampling programs are of gem quality. This includes a 14.2-carat white diamond, the largest ever discovered in the State Line district and the eighth largest found in North America.

The Kelsey Lake prospect consists of eight kimberlite pipes. However, the trial mining program will focus on the two largest pipes. These have a surface area of about 4.8 ha (12 acres) and contain about 17 Mt (19 million st) of ore down to a depth of 100 m (330 ft). Initial diamond recoveries are estimated to be up to 25,000 carats/year.

Anvil Resources acquired kimberlite prospects in the Chicken Park area of the State Line district. Earlier prospecting in this area yielded 306 diamonds including a 2.5 carat industrial-grade diamond. The company was drilling the property in August 1995.

The Sweet Home Mine is an old silver prospect in Park County. In 1991, it was reopened as a rhodochrosite gem mine. During the past five years, the mine has produced several world class examples of cherry red rhodochrosite crystals, including one thought to be the largest in the world.

Gypsum production during 1995 at the Eagle Gypsum Mine in Eagle County reached its 360 kt (400,000 st) capacity. The gypsum is manufactured into wallboard and other products at the plant in Gypsum. About 50% of the wallboard produced at the plant goes to the Colorado construction industry. The rest is marketed throughout the country.

White River Nahcolite produced about 50% of Colorado's nameplate capacity of 121 kt/a (125,000 stpy) of nahcolite (NaHCO_3). Production came from its solution mine in Rio Blanco County. The company produces food- and industrial-grade sodium bicarbonate from the 6- to 7.6-m- (20- to 25-ft)-thick Boies Bed, a Tertiary lacustrine deposit 610 m (2,000 ft) deep. White River Nahcolite is currently producing from solution cavity No. 4. It is projected to yield of 1113 kt (25,000 st) at a well spacing of 915 m (3,000 ft).

Exploration

Hendricks Minerals Canada signed an earn-in agreement with Echo Bay Mines on Hendricks' Cross Mine in the Caribou district of Boulder County. The Cross Mine is a stockwork vein gold deposit located along the contact of a Tertiary quartz monzonite intrusive and surrounding Precambrian rocks. Preliminary reserve calculations completed in 1994 indicated 1 Mt (1.1 million st) grading 2.7 g/t (0.08 oz/st) including a high-grade zone of 351 kt (387,000 st) grading 7.2 g/t (0.21 oz). Echo Bay evaluated the prospect in 1995 and terminated the agreement.

Summo is a partnership consisting of Denver-based St. Mary Minerals Inc., MLP Associates and other investors. During 1995, it completed 25 exploration drill holes on the Cashin copper prospect in Montrose County. The best hole intersected 50 m (160 ft) of 1.18% copper. A total of 77 drill holes have been completed on the project. The tabular-shaped ore body in the Triassic Wingate Sandstone is about 45 m (150 ft) thick. It consists of two layers, an upper oxide zone primarily of

malachite and azurite and a lower chalcocite (sulfide) zone. The preliminary drill-indicated reserve is 12 Mt (13 million st) grading 0.5% copper for about 59 kt (130 million lbs) of copper. Metallurgical tests confirm that the ore is amenable to a solution extraction-electrowinning process. Projected average recoveries are 80% for both ore types. Column-leach testing of bulk oxide and sulfide samples and collecting of environmental baseline data is planned for 1996.

The Powderhorn district in Gunnison County is estimated to contain about 450 Mt (500 million st) of titanium ore. Most of the titanium resource is in perovskite, a mineral that presents unique processing problems. Teck Resources has been evaluating the Powderhorn titanium resource since 1990. Only market evaluation work took place in 1995. In 1996, Teck plans to conduct metallurgical testing and will probably undertake a prefeasibility study.

Royalstar Resources completed the first phase of bulk sampling at the Sloan kimberlite prospect in the State Line district during 1994. Plans for 1995 included additional drifting and crosscutting below surface high-grade zones. However, legal complications concerning the mineral lease forced Royalstar to suspend further exploration efforts on the Sloan kimberlite.

American Alkali, formerly Natrona Resource of Glenwood Springs, has provisional plans to conduct drilling for environmental baseline information this spring on its proposed soda ash and sodium bicarbonate plant and solution mine site in the Piceance Basin in Rio Blanco County.

Phelps Dodge is looking at precious and base metal opportunities in Colorado. The company has conducted an exploration drilling program on an undisclosed prospect in the southwestern part of the state. More exploration is planned for 1996. BHP is also conducting a base-metals exploration program in undisclosed areas. ■

IDAHO

V.S. GILLERMAN and E.H. BENNETT, Idaho Geological Survey

Idaho mines poured 9.3 t (300,023 oz) of gold during 1995, a new record. Pegasus Gold's Black Pine Mine in Cassia County was the leader with more than 3.3 t (108,000 oz) produced. Hecla Mining and FMC Gold also added significant amounts. Hecla produced gold from its newly dedicated Grouse Creek Mine in Custer County, while FMC began operations at its new Beartrack Mine in Lemhi County.

Small gold producers included US Antimony's Yellowjacket Mine in Lemhi County and CSC Mining's Rescue Mine at Warren. Kinross Gold opened the Stone Cabin Mine in Owyhee County.

Meanwhile, Thompson Creek Mining continued full operations with 189 employees at its Thompson Creek molybdenum mine in Custer County.

Exploration for metals continued on many advanced projects (Fig. 1). Drilling also took place in southeastern Idaho on phosphate tracts.

Coeur d'Alene district and north Idaho

Higher silver prices resulted in increased exploration and mining activity in the Silver Valley, a billion-ounce district. Sunshine Mining introduced diesel equipment at the Sunshine Mine. This helped to cut costs and increase production. The company closed the Big Creek

silver refinery but continued exploration on the West Chance area of the mine. High-grade vein intercepts from underground drilling and drifting averaged more than 2,057 g/t (60 oz/st) of silver. By November, a 18.6-t (600,000-oz) reserve had been blocked out.

Hecla used the underhand mining method to produce 49.7 t (1.6 million oz) of silver and substantial lead from its Lucky Friday Mine. Exploration continued on the company's Gold Hunter project adjacent to the Lucky Friday. A 1,220-m- (4,000-ft-) long drift from the 5100 level of the Lucky Friday was under way to explore the Gold Hunter.

Asarco conducted exploration drilling at the Galena Mine, though it and the Coeur Mine remained closed. The two properties are owned jointly with Coeur d'Alene Mines.

The New Bunker Hill Mining Co. continued mining about 91 t/d (100 stpd) of lead-zinc ore from the Bunker Hill Mine. The project also carefully extracted pyromorphite crystal specimens.

Salmon area

Lemhi County was the place to be during 1995, with a new mine dedication and several hot projects. FMC Gold dedicated the Beartrack Mine at Leesburg on Aug. 19. Plans call for a seven-year mine life, producing 3.1 t/a (100,000 oz/year) of gold from the open-pit, heap-leach operation. Beartrack is the first mine in the state to use plastic "bird balls" to disguise the cyanide pond from overflying waterfowl. The North and South pits were open by the end of 1995 and 30 exploration drill holes completed along the Panther Creek Fault between the two ore zones.

American Gold Resources (AGR) continued drilling and permitting on its Humbug project near North Fork. One-hundred-one reverse-circulation holes and several metallurgical holes were drilled on the 200 hm² (495 acres) of private ground. A cone minable reserve of 18.6 t (600,000 oz) of gold is hosted in 14.5 Mt (16 million st) of sheared phyllites and intrusive sills. The proposed project would include a 28-hm² (70-acre) pit, two waste dumps and a heap leach pad. It would also require diverting Ditch Creek to Little Ditch Creek. AGR also drilled five reverse-circulation holes at its Haidee Mine property on Arnett Creek, southwest of Beartrack, for a total of 220 holes on that advanced project.

Newmont Exploration mapped and sampled its Musgrove project but did not drill. The company won an Idaho Land Board reclamation award for the project. Newmont was reviewing its options at the end of the year.

Cominco drilled six reverse-circulation holes on private ground adjacent to the Kirtley Creek placer gold mine. The target was similar to Leesburg where the lode source of the placers is now mined at Beartrack. Unfortunately, Cominco encountered thick alluvium and never hit any bedrock source. The company continued reconnaissance in the region.

Battle Mountain Gold explored its joint-venture property with Formation Capital. The partners drilled four reverse-circulation holes at the King Solomon Mine and four at the Gilt Edge property, both gold prospects. Teek and Pathfinder drilled the King Solomon in past years but these were the first holes on the Gilt Edge.

Falcon Ventures International, a Vancouver-based



company, started work late in the year on another joint venture with Formation Capital, the Queen of the Hills gold mine. A winter drilling program of about 1,535 m (5,000 ft) of reverse-circulation hole was planned.

BHP Minerals dropped its interest in the Bobcat property after disappointing results from 1994's three-hole program on the porphyry target. Formation Capital attempted two shallow drill holes at the Bowman property, but drilling problems forced the company to give up without testing the target. Owners of the St. Claire Mine near the Montana border built a magnetic separator for a small ball mill at the high-grade gold property, but only a few tests were made before winter.

Cobalt prices are more than \$66/kg (\$30/lb). This made cobalt as attractive as gold. The Precambrian Idaho Cobalt Belt cuts directly across Lemhi County. Formation Capital had two big cobalt projects. One surrounded the Environmental Protection Agency's remediation work at the Blackbird Mine, which hosts the nation's largest cobalt reserve. Noranda, owner of the patented claims at Blackbird, was thought to be considering its own exploration program in the district.

The Blackpine Mine is located several miles east of Blackbird. Formation Capital continued definition core drilling throughout the summer, bringing to 214 the total of holes drilled. Emphasis switched from the open-pit, oxide copper-cobalt resource to the higher grade cobalt-gold "feeder zone" targets. The Regina, Trench, Swift and Troll zones were drilled. Formation acquired the Blackpine property in 1993.

During September, Formation shifted its drills to the Blackbird Mining District, where the company picked up a large land position during 1994 after Noranda dropped

its unpatented claims surrounding the patented property. During the first half of 1995, Formation geologists conducted an extensive mapping and sampling program. They also compiled the voluminous records from past company and government work.

Three core rigs were going on four target zones — the Old Northfield mine area, the Sunshine, East Sunshine and Cougar zones. The Cougar zone is a new discovery. It has 1% cobalt and 17.2 g/t (0.5 oz/st) gold in prospect pits and Formation Capital drill four holes. Fourteen holes were drilled on the Northfield zone, where 17 holes existed from work in the 1950s. About two-thirds of the 9,145-m (30,000 ft) of drilling was to test the Sunshine zone, which lies west of the main Blackbird workings. Results from the 51 holes on the Sunshine computed to a reserve of 363 kt (400,000 st) averaging 1.1% cobalt, 0.26% copper and 0.9 g/t (0.025 oz/st) gold. The zone is open in two directions.

West central Idaho

USMX drilled 1,120 m (4,000 ft) of core for exploration and geotech holes at the Dewey Mine in the Thunder Mountain District east of Stibnite in Valley County. The company also installed monitoring wells and began environmental baseline studies on wetlands, fish and water.

Total drilling on the patented property by USMX and five previous owners totaled 19,900 m (62,000 ft) in 256 holes. Of that, USMX has done half. Last year's work produced a minable, heap-leach reserve of 4.8 Mt (5.3 million st) grading 1.6 g/t (0.047 oz/st) of gold with a stripping ratio of less than one. Mine permitting is under way.

American Industries performed test milling on ore from the Fourth of July Mine at Big Creek. Placer Dome was also exploring in that region. Golconda Resources drilled nine holes near New Meadows to test mafic tuffs for their diamond potential.

East central and south central Idaho

The first full year of operation of Hecla Mining's Grouse Creek precious-metal mine proved disappointing. Mining had started in the small high-grade shoots underground on the Grouse Creek deposit and in the Sunbeam pit. Grades in the Sunbeam were substantially lower than expected. In October, Hecla announced a \$97-million writedown on the project. Operations are ongoing and Hecla maintained an aggressive exploration program at Estes Mountain, across the valley from the Grouse Creek Mill.

Duke Resources drilled 12 reverse-circulation holes in Montana Gulch across Jordan Creek from Hecla's mine. Some of the holes were up to 305 m (1,000 ft) deep into the volcanics.

US Antimony dismantled its Preachers Cove Mill on the Yankee Fork due to environmental concerns and vandalism. The closing of the last custom mill could be a blow to small mines in the region.

Curator American tested its DSA property for stratabound zinc mineralization near Bear Peak at the headwaters of the North Fork of the Big Lost River in Custer County. The company has 225 claims and drilled six core holes, totaling 940 m (3,086 ft). Results were pending. The area has been explored since 1982.

Near Ketchum, Biomyne focused on geological work

and permitting for 1996's drill program in the Rooks Creek drainage. Aurtex, Biomyne's parent, had its own program at the Vienna District. Aurtex obtained a lease on the private ground that hosts rich silver veins at Vienna. The company mapped and trenched the area. Drilling was planned for 1996.

Consolidated Ramrod Gold and Atlanta Gold completed a stock swap that gave Consolidated Ramrod 100% ownership of the Atlanta gold project in Elmore County. The company then reorganized as Ramrod Gold Ltd.

The Atlanta property hosts open-pit reserves of 35.7 t (1.15 million oz) of gold and 93.3 t (3 million oz) of silver in two pits. There is also an underground resource estimated to be 725 kt (800,000 st) grading 11.7 g/t (0.34 oz/st). During the past three years, Ramrod and Newmont spent \$2.5 million on a drilling program at the property. Financing negotiations were the major activity during 1995.

Boise Basin and southern Idaho

Republic Gold explored the Mineral Hill claims near Placerville with trenching and two shallow core holes.

Cactus West returned for another year of work at its Century property near Placerville. The company drilled 12 reverse-circulation holes, totaling about 2,440 m (8,000 ft) near Alder Creek Summit. The company also picked up the Cumo property on Upper Grimes Creek. Cumo hosts a large, low-grade molybdenum deposit that was drill by Amax in the 1970s.

Echo Bay Mines continued a second year of work at the Kilgore precious metals property in Clark County in eastern Idaho. The company drilled 9,145 m (30,000 ft) of core and reverse-circulation. An environmentally friendly, helicopter-supported core rig worked well, even on deep holes and saved permitting time. Placer Dome remains a partner in the project. It was initially discovered by Kennecott during the mid-1980s.

On top of Florida Mountain, Kinross Gold is building Idaho's newest gold-silver mine. The Stone Cabin project in Owyhee County was constructed after the US Bureau of Land Management signed a Record of Decision in April. The new 10-km- (6-mile-) long haul road from the mine site to the DeLamar Mill was completed by fall and the first blast in the pit was detonated on Sept. 6, 1995. Reserves are 6.3 Mt (7 million st) grading 1.5 g/t (0.045 oz/st) gold and 17.2 g/t (0.5 oz/st) silver with a 5:1 stripping ratio. The mine will include three pits and the Jacobs Gulch waste area.

Industrial minerals

Idaho's industrial mineral producers had a good 1995. Phosphate continued to be the largest mineral industry in the state. NuWest Industries operates a phosphoric acid plant at Conda. The company was sold to Agrium, a Canadian ag-chemical firm.

Mining and processing operations by FMC, Simplot, Monsanto, Rhone Poulenc and Kerr McGee (vanadium), as well as NuWest, were at full production. Aggregate was in great demand by the construction industry.

Emerald Creek Garnet is the nation's largest garnet producer. The company improved its mill and performed reclamation work in north Idaho. Hess Pumice in Malad was building a second fine-grinding plant due to increased demand. ■