

# MINING ENGINEERING

MAY 1990

A PUBLICATION OF THE SOCIETY  
FOR MINING, METALLURGY,  
AND EXPLORATION, INC.

UNIVERSITY OF IDAHO  
LIBRARY/PERIODICALS 6123150  
MOSCOW ID 007  
R 2902



1989  
ANNUAL REVIEW

## STATE ACTIVITIES 1989

1.4% of the total value. Mining employment in the state was about 7100 people in 1989, a slight increase from 1988. Coal and non-metals employed about 4100 people while metals employed 3000.

Tenneco Minerals continued exploration drilling for silver in the Kate area, north of Silver Cliff in Custer County, on land leased from CoCa Mines. Other metallic exploration and some mine development occurred in Boulder, Clear Creek, Gilpin, and Ouray Counties.

The increase in the price of molybdenic oxide to about \$8.36/kg (\$3.80 per lb) last year enabled Climax Molybdenum to increase its output to about 16.3 kt (36 million lbs), up from 13.6 kt (30 million lbs) in 1988.

Lower demand in the marketplace at the end of the year, however, caused the Golden, CO-based company to announce a 15% decrease in production from its Henderson mine beginning in 1990.

Total gold output in Colorado plummeted 48% last year, due mostly to the closure of two mines. The London mine, in Park County, closed in June and the mill closed in July. Both had been in production for about one year.

The Summitville mine, in Rio Grande County, closed in June after a crack was detected in the leach pad embankment. Summitville was the state's largest gold producer from 1986 through 1988.

Several smaller mines and milling operations were conducting development and rehabilitation work and some ore extraction in Boulder, Clear Creek, and Gilpin Counties.

Two new gold mines that had planned start-ups last year have stalled. Nevada Goldfields and its partners in joint venture of the Empire project, in Clear Creek County, did not begin surface operations as planned for the fall. A new partnership including Noranda Exploration was formed in December. The Empire property was reported to have proven and probable reserves of about 458 kt (505,000 st) grading 4.4 g/t (0.127 oz per st) of gold in one of two major mineralized gold-bearing zones.

Regarding the second new gold mine, a citizen's lawsuit temporarily stopped Battle Mountain Gold from starting operations at its San Luis project in Costilla County. Battle Mountain expects to produce about 1.8 t/a (60,000 oz per year) of gold from San Luis. ♦

### Idaho

E.H. Bennett, V.S. Gillemann, V.E. Mitchell,  
Idaho Geological Survey

Precious metals dominated exploration efforts in Idaho in 1989. The number of active exploration projects in the state increased from 68 in 1988 to 82 in 1989. An active project is defined as one that has had some significant work, such as sampling and trenching or drilling, not just claim staking.

Meridian Gold's Beartrack project, discovered last year, sparked interest in the Salmon area and companies flocked to this part of the state. Excitement generated by discoveries of several low-grade disseminated gold deposits in southeastern Oregon spilled over into Idaho. Companies were also active north of Yellowpine in Valley County and in the Elk City area. Overall, most of the old gold producing districts in the state received some attention. Assuming an average expenditure for each project of \$250,000, the value of exploration in Idaho in 1989 is conservatively estimated at \$20 million.

#### Coeur d'Alene district

All working mines in the Coeur d'Alene mining district conducted normal underground operations including development and exploration work. Asarco operated the Coeur mine (owned by Coeur d'Alene Mines) and the Galena mine (owned by the Callahan Mining). Hecla Mining continued with production and development of the longwall stopes in the Lucky Friday mine. Bunker Hill completed its first full year of zinc production from the Bunker Hill mine. The old Star-Morning mine, closed in 1982, was reopened by the Star Phoenix Mining Co. and will go into production this year.

Lucky Eagle Mines is a joint venture between Hecla Mining Company, 57%, and Agnico Eagle Mines of Toronto. They plan to spend about \$6 million on exploration programs at the Gold Hunter mine, located west of Hecla's Lucky Friday mine, and on 21 other jointly held properties in Canada and the US.

Cimco Mining of Spokane, WA, signed a joint venture agreement with the China National Nuclear Industry Corp. to develop a \$2.7-million gold placer mine on the East Fork of Eagle

Creek near Murray. Four Chinese engineers and geologists will work with Cimco next year on the placer. The Chinese will invest at least \$1 million on this and other Cimco projects. The Eagle Creek placer is one of four large placers in the area slated for start-up in 1990.

Viking Investment increased its ownership in Golden Chest by 120,000 shares. The company has a long-term lease on the historic Golden Chest mine near Murray, a former gold producer. The 202-hm<sup>2</sup> (500-acre) tract is part of a 2428-hm<sup>2</sup> (6000-acre) joint venture project with Newmont Exploration. In June, Newmont applied for permits to construct 610 m (2000 ft) of road and drill a maximum of eight reverse circulation holes on the Golden Chest property. Preliminary drilling results indicate reserves of 4.3 Mt (4.8 million st) averaging 1.5 g/t (0.043 oz per st) of gold.

Viking is also trying to start a placer operation near the Golden Chest mine that is not subject to the agreement with Newmont. The investment corporation is owned by former players with the Minnesota Vikings football team. Golden Chest also has a 202-hm<sup>2</sup> (500-acre) holding (the F-C claim group) near the Beartrack deposit north of Salmon.

Newmont permitted a 22-hole drilling program on the Mother Lode property on Ophir Mountain, east of Murray, under a lease agreement with International Basic Resources. The Mother Lode property lies across Prichard Creek from the Golden Chest mine.

Hecla Mining has been drilling from the surface and underground on the Snowstorm and Silver Mountain areas east of the Lucky Friday mine and on property controlled by Inspiration Lead and Silverore Mining Co.

Callahan Mining continued with exploration and development at the Caladay project, located just east of the Galena mine. Work concentrated on a deep drilling program to define the Boundary veins on the 4900 level of the Caladay. The Boundary veins were discovered last year and are near the Galena-Caladay property line.

Asarco finished the long tunnel from the 3400 level of the Coeur mine known as the American Silver drive. The target of the long-term program was the Wire Silver vein. Results from the project are being evaluated.

Idaho Fish and Game ran into a snag when a private pond it had been stocking with fish was included in a placer mining plan as a settling pond. The Eagles Nest pond is owned by the Coeur d'Alene Placer. Fish and Game will stop stocking the pond. The news was disappointing to many residents in the Enaville area who had been fishing at the pond for the past 10 years.

Silver Cable cleaned up the adit at the Silver Cable mine located near the Idaho-Montana border, just east of the Coeur d'Alene mining district. Several leasers are reportedly interested in the property.

#### Other north Idaho

Cominco American Resources began work on more than 100 claims at the Idaho-Buckhorn mine, located near the top of Scout Mountain on the Idaho-Montana border. The mine, abandoned in the 1930s, is near the headwaters of Mill Creek, which empties into upper Deer Creek. Four adits on the property were opened and six core holes, totaling 914 m (3000 ft), were drilled. Cominco is believed to be evaluating the polymetallic property for underground mining. The mine is at an elevation of about 1767 m (5800 ft).

Cominco also drilled two core holes at its Grassy Mountain property on private ground east of Coeur d'Alene Lake. The holes were spotted on geophysical anomalies from an airborne EM and HLEM survey and on soil sampling and mapping.

John Hadyn continued underground work at the Gold Dust mine in Mountain Gulch near Potlatch.

The US Forest Service conducted validity exams on 131 claims in the Gospel-Hump Wilderness. These claims were staked before the wilderness area was officially withdrawn from mineral entry on Dec. 31, 1988. Twenty-five mineral examiners started the process that will continue next year.

Canyon Resources drilled 22 reverse circulation holes on the Comstock property near Dixie. The property is adjacent to the Robinson Dyke mine, where previous drilling has outlined a resource of about 725 kt (800,000 st) of 1.4 g/t (0.042 oz per st) of gold in a leachable mixed oxide-sulfide shear zone deposit. Canyon also conducted an active reconnaissance program in the Dixie and Elk

City areas. The company put the Kendall mine in Montana into production and will benefit from its partnership in the Beartrack venture near Salmon with Meridian Gold.

Newmont began an exploration program near Golden on the South Fork of the Clearwater River. The company acquired 180 claims around the New York mine and did an airborne magnetic survey and soil sampling program last

owns 75% of its joint venture with Formation Capital.

Formation Capital is involved in an exploration venture with Corona and Hecla on a 400-claim block around the Queen of the Hill mine, west of Salmon. The three companies are planning to open adits at the King Solomon mine as soon as an archaeological survey can be conducted.

Corona Gold drilled about 20 holes in Wimpey Creek and four holes on Kenney Creek, located south of Salmon along the Bitterroot front.

Placer Dome mapped, sampled, and drilled at Kenney Creek, one of two properties it controls in the Salmon area. Surface work was conducted at Freeman Creek. The properties are joint ventures with Broken Hill Proprietary.

Meridian Minerals Company continued exploration and development at the Beartrack property, the largest gold discovery ever made in Idaho. About 3 km (10,000 ft) of core and more than 200 reverse circulation holes were drilled in 1989 for a total of about 350 holes. To date, a reserve of 22.6 Mt (25 million st) of oxide ore containing 18.6 t (600,000 oz) of gold has been identified. It will be developed as a heap leach, open-pit mine with an initial investment, including exploration, of \$40 million.

The discovery lies on both sides of the Panther Creek fault (part of the trans-Challis fault system). Ore is hosted in augen gneiss and metasedimentary rocks of the Yellowjacket formation.

The South deposit is mineralized from the surface to more than 152 m (500 ft) deep and contains about 15 Mt (16.7 million st) of 2.4 g/t (0.068 oz per st) of gold. The North deposit contains 18.3 Mt (20.2 million st) of 1.5 g/t (0.044 oz per st) of gold (1988 figures). The company plans to produce about 2.48 t (80,000 oz) of gold annually. Reserves are believed sufficient for at least seven years of operation. Permitting is under way on the heap-leach mine which could start up in 1991-92.

The Beartrack deposit also contains an estimated 62.2 t (2 million oz) of gold in sulfide ore. Canyon Resources, discoverer of Beartrack, is a 15% partner in the venture. An announcement in December that Burlington Resources, parent of Meridian Gold, would sell its gold



Exploration and development projects in Idaho during 1989.

summer.

Idaho Gold successfully tested an agglomerating system at the Buffalo Gulch heap leach gold mine, west of Elk City. The heap leach technique was tested last year. It was found that the high clay content of the deposit requires that the ore be agglomerated with cement. The mine is expected to be in production this year. The company also plans to develop a mine at Erickson Ridge, north of Buffalo Gulch. About 100 people will be employed at the operations.

#### Salmon Area

Corona Gold drilled 33 reverse circulation holes on its 90 km<sup>2</sup> (35 sq mile) Bobcat Gulch (Smith Gulch) project in the Moose Creek Basin area of Lemhi County. The property was drilled as a copper-molybdenum target by Cominco in 1980 and is now being looked at for precious metals. The claims are adjacent to the Beartrack discovery. Corona

## STATE ACTIVITIES 1989

company is not expected to delay development of the Beartrack project.

American Gold Resources (AGR) built roads and drilled several holes near the Haidee mine on Arnett Creek in 1988. Work in 1989 centered on the Little Chief mine. Ore grade mineralization has been found on four target areas on Arnett Creek. In 1988, BP Minerals was a joint venture partner on this project but dropped its interest last year. Late in the year, Meridian Gold became a joint venture partner with AGR on the 68.7 km<sup>2</sup> (17,000 acre) property that adjoins the Beartrack claims to the east.

Amax conducted a geophysical survey and drilled 15 holes at the Rabbits Foot mine in Lemhi County. The gold mine is only one of several being evaluated in the trans-Challis fault system.

Sovereign Exploration (US exploration subsidiary of Total Energol) drilled 12 diamond drill holes on the Gold Star property (10 km<sup>2</sup> or 2480 acres) located on Tower Creek, 24 km (15 miles) northeast of Salmon. Another program used surface IP, magnetics, and soil sampling to outline five target areas at Pine Creek near Shoup. Twelve holes were drilled on this project. Sovereign also conducted surface studies at Phelan Mountain but has since dropped this lease.

GEXA continued its preliminary exploration at Musgrove Creek near Blackbird Mountain.

Goldrite US received permits for a preliminary mineral evaluation in the Wagonhammer, Burns Basin, and Silverleads areas near Gibbonsville.

Noranda dropped the Kittie-Burton mine at the beginning of the year. The property was drilled in 1988.

Charles Duus conducted surface geochemistry at the Monitor Mine on Owl Creek this year.

Elton Walton was trying to mill old dumps at the St. Claire mine.

West Fork Gold drilled again on the West Fork of Indian Creek. The company plans on returning in 1990.

American Gold Resources and Cominco plan on drilling in Deep Creek near Cobalt.

Metron Resources drilled about six holes on its Porphyry Ridge property. Homestake drilled the property last year and reportedly outlined 136 kt (150,000 st) of 5.5 g/t (0.16 oz per st) of gold in a structurally complex vein zone. The geology and metallurgy are under study.

FMC drilled 25 reverse circulation holes at Ditch Creek near North Fork. The company is trying to increase reserves so it can mine the property. This is a turnabout from last year when FMC tried to joint venture Ditch Creek. FMC also drilled seven holes at Sage Creek and will drop the property.

RCO Resources began clean-up operations at the Pope Shenon mine south of Salmon. The former copper mine is being evaluated for possible production but little actual work was done in 1989.

American Gold Resources reportedly drilled on Diamond Creek. Centurion Gold drilled three diamond drill holes on Iron Creek south of Salmon. The old Coastal Mining property is a copper/cobalt occurrence in folded rocks of the Yellowjacket formation. There is also a gold target.

Hecla Mining obtained the Buckhorn claims near Williams Pass, south of Salmon. They are joint venturing the property with Formation Capital.

Idaho Energy Resources continued to evaluate thorium properties near the Wonder Lode and Caga mines in the Lemhi Pass thorium area. Most of the work was done on the Montana side of the state line.

E.J. Wilson & Sons drilled one exploratory hole looking for precious metals near its gypsum quarry (the Snowball claims or Gyp deposit) on Clear Creek near Leadore.

Homestake drilled three holes near Bohannon Creek south of Salmon. The results were disappointing and the property was reclaimed and dropped.

### West-central Idaho

Pegasus picked up the McKinlay mine east of Lucille in Idaho County. The company mapped and sampled it this year.

Freeport McMoRan Gold is exploring for gold in the Logan Creek-Smith Creek area, about 5.6 km (3.5 miles) west of Big Creek in the Payette National Forest. Freeport built a few new roads and conducted a first pass, reverse circulation drilling program in the vicinity of the old Independence mine. Freeport obtained an option on the Blue Bluff property in Idaho from Thunder Mountain Gold. It is part of the Profile Gap project in the Logan Creek area.

Kennecott Exploration did surface geology and geochemistry around the old Moscow mine in the Big Creek area. A proposed drilling program scheduled

for this fall was cancelled due to poor weather.

Placer Dome was active on Quartz Creek east of Yellow Pine.

FMC conducted surface exploration near the Warren District and is evaluating the results.

Hecla Mining completed construction of its \$3.9-million heap leach facility at Stibnite. Mining and stockpiling commenced late last fall. Ore mined from the Homestake pit or Yellowpine mine is stacked on a leach pad in continuous lifts. The final heap will be about 30 m (100 ft) high and cover about 4.4 hm<sup>2</sup> (11 acres).

Reserves at the Yellowpine mine are about 1 Mt (1.1 million st) of oxide ore from which Hecla will extract about 2.48 t (80,000 oz) of gold over the next two years. A large sulfide ore reserve of 13.6 to 18 Mt (15 to 20 million st) of 3.5 g/t (0.1 oz per st) gold may be mined later using a different milling technique.

Coeur d'Alene Mines continued development at Lightning Peak adjacent to the Thunder Mountain (Sunnyside) gold mine east of Stibnite. The mine may replace the Sunnyside, which was mined out in 1989. Grades at Lightning Peak are comparable to the Sunnyside, averaging 2.4 to 34.3 g/t (0.07 to 1 oz per st).

Stow Resources of Vancouver, BC, rehabilitated the middle and upper of three adits at the Franklin D. Mine in Valley County, south of Yellow Pine. The company mapped and sampled the underground and ran about 13 km (8 miles) of ground magnetics and VLF-EM on the surface, in addition to surveying and claim staking. Stow will apply for permits to diamond drill this year. The deposit is a gold-bearing shear zone.

### East-central Idaho

Yellowstone Resources acquired the Parker Mountain mine located in Custer County from Dennison Mines (US).

US Antimony (USAC) and Western Gold Exploration and Mining (Westgold) signed an exploration agreement for work at the Yellowjacket gold mine in Lemhi County. Westgold can earn a 51% interest in the project by investing \$2 million. Work so far has outlined a shallow ore body containing 369 kt (407,122 st) of 3.5 g/t (0.1 oz per st) gold. The ore body is faulted off at depth and Westgold planned on drilling 15 holes to a depth of 183 m (600 ft) to

look for the faulted extension. Westgold conducted an extensive surface geophysics program to spot drill targets in the area. Results of the drilling program are under evaluation. USAC has reportedly filed plans with the Forest Service for a flotation mill at Yellowjacket.

Westgold obtained a lease on the Estes Mountain mine from US Antimony. The gold mine, located on Jordan Creek, was operated by USAC for several years. Westgold will spend \$2 million on the property to earn a 51% interest. Activities in 1989 included detailed mapping and sampling.

CoCa Mines acquired Geodome Resources, the parent of Sunbeam Mining, in a stock swap. Sunbeam was in the permitting stage for a major gold mine at the old Sunbeam mine on Jordan Creek for several years and spent about \$10 million on the property over the past decade. The company thought all permits had been obtained but an injunction by the National Wildlife Federation and other environmental groups delayed a start-up scheduled for 1989.

The problem revolved around the Pinyon Basin wetland that would be used for part of the mining operation. CoCa has noted that it may change the mining plan and go with a conventional concentrating plant rather than a vat-cyanide operation thereby eliminating some of the environmental problems.

A drilling program by Sunbeam and CoCa on Grouse Creek, north of the Sunbeam mine, has increased reserves at the property and the two deposits may be linked together. The Sunbeam property has reserves of 3 Mt (3.3 million st) of 2.6 g/t (0.077 oz per st) gold. Drilling on Grouse Creek has delineated reserves of 4 Mt (4.4 million st) of 1.4 g/t (0.04 oz per st) gold and 66.5 g/t (1.94 oz per st) silver.

#### South-central Idaho

Westgold continued to evaluate the Cu-Au skarn at Copper Basin in 1989. Detailed mapping and soil sampling were followed by a second round of five to seven reverse circulation holes. Results were not available at year's end. Westgold also had an active reconnaissance program throughout Idaho.

Sovereign Exploration was active with surface geological and geophysical work all summer in the Mackay area. This fall a 3-km (10,000-ft) reverse circulation drilling program was underway on the Wadoups, Lava Creek, and Whiskey Road properties in the Mackay and Lava Creek areas.

Earl Waite continued development work at the Webfoot mine in the Vienna

District. Cominco drilled eight reverse circulation holes in Leeman Basin near Mackay.

Yankee Machine continued with an exploration and development program at the Greyhound mine.

Westmont continued core drilling and detailed mapping and geochemical sampling at its DSA property in Bear Creek on the North Fork of the Big Lost River.

Noramco Exploration continued its extensive surface exploration effort at the Camas district gold project near Bellevue. Noramco is also actively exploring an extensive claim block in the black shale belt near Hailey.

Manville is exploring in two areas near the Lava Creek district. The company drilled several core holes last year near the old Paymaster mine.

Hecla Mining drilled in Muldoon Canyon, Blaine County, reportedly looking for stratiform mineralization in the Drummond mine Limestone.

Officials from the Sawtooth National Recreation Area (US Forest Service) granted permission for Billiton Minerals, a subsidiary of Royal Dutch Shell, to begin a 14-hole drilling program for gold in Washington basin. Sunshine Mining is a partner in the venture. Eight holes were completed and the area reclaimed by October. Results are being evaluated. This is an environmentally sensitive area and the drilling program was protested by environmental groups.

Duke Resources announced plans to begin an exploration program in central Idaho. The company began work on a small placer in the Yankee Fork district.

A judge has ordered Shama Minerals, involved in an investigation related to a religion/mining scandal, not to do assessment work on its claims this year. This means that the largest claimant in the state will have to ask the Bureau of Land Management for a waiver on the assessment work.

#### Boise basin

The management of Atlanta Gold was in a legal shoot-out with US Gold (owned 16% by Placer Dome and 4% Amax) for control of the company. The hostile takeover attempt began in January when US Gold began buying Atlanta stock on the open market. US Gold was joined by Ventures Trident Ltd. Partnership, controlled by one of Atlanta Gold's officers, in May. Together, the partners controlled about 25% of Atlanta Gold's stock.

US Gold claimed lack of diligence in opening up the Atlanta gold/silver property in central Idaho and offered its

proprietary bio-oxidation technology to Atlanta to process refractory ores at the site. Atlanta won the first round in mid-June at its stockholders meeting. A court battle in British Columbia was, in turn, won by US Gold. The final appeal to the Court of Appeals of British Columbia was heard in December and Atlanta Gold once again prevailed. Company geologists spent the field season doing detailed surface mapping aimed at understanding the ore controls and structure.

The Atlanta property covers 12.5 km<sup>2</sup> (3100 acres) and has been under exploration and development since 1985. A feasibility study by Behre Dolbear-Riverside indicates that at the proposed East pit reserves total 7.5 Mt (8.27 million st) of 3 g/t (0.087 oz per st) gold.

Operating costs for the open-pit mine would be \$7.97/g (\$248 per oz). The ore would be concentrated by flotation and then treated by bio-oxidation and cyanidation. Annual production is estimated at 3.1 t (101,180 oz) of gold and 8 t (258,100 oz) of silver annually for the first six years with an 84% recovery rate. The remainder of the ore would be treated by heap leach. The West pit contains an additional 5.6 Mt (6.2 million st) of 1.7 g/t (0.049 oz per st) gold with a recovery rate of 80.4%. This would extend mine life two-and-a-half to four years. Employment at the remote mine site could be as high as 200.

Initial investment for the mining and milling operation (estimated at nearly \$42 million) would be repaid in 2.4 years at \$12/g (\$375 per oz) gold. Atlanta Gold has invested about \$10 million in the venture. The company is reportedly for sale. If a buyer is not found, Atlanta Gold is interested in finding a joint venture partner for Atlanta Hill. Due to the legal problems this year, start-up of the mine has been delayed until 1991.

Gexa Gold, signed an agreement with Newmont Exploration to evaluate 179 claims in the Rocky Bar area (Black Warrior district). Newmont will spend \$1.5 million on the project to gain a 50% interest. Following extensive soil sampling, Newmont drilled 19 reverse circulation holes in late 1989 in a first pass effort concentrated on one of several target areas. Gexa has been exploring the property since 1981.

RST drilled three holes on a claim block in Hardscrabble Gulch near Rocky Bar.

Centennial Resources continued development drilling at its Centennial property on Blacks Creek in the Neal District east of Boise. Two rigs drilled more than 150 reverse circulation holes

## STATE ACTIVITIES 1989

last summer along a well-defined fault line. Permitting and feasibility studies have been started for a small heap leach oxide gold deposit, which is mostly on private land.

Westmin Resources conducted surface evaluations of several properties controlled by Cactus West in the Boise Basin. Mapping and sampling of 2438 m (8000 ft) of backhoe trenches and subsequent reclamation was completed in a month. Cactus West will be drilling one of the anomalous areas late in the year.

Cactus West Exploration drilled about 457 m (1500 ft) of core on claims that include the Missouri Gold mine, located about 24 km (15 miles) north of Idaho City. This is near the site where George Grimes first discovered gold in 1862. Frontino did some mapping and surface exploration on a vein near Mineral Hill.

Freeport, Goldpost Resources, and Westmin Resources are exploring between Grimes Creek and Quartzburg. Westmin is at the old Belschazzar mine.

### Southeast Idaho

Noranda continued evaluation of a proposed heap leach mine in the Black Pine Mountains in southeastern Cassia County. The site is at the old Tolman mine, a past gold producer. Federal agencies approved the company's operating plan in August, although state permits must still be obtained. A snag concerning wildlife was worked out with the Idaho Department of Fish and Game.

Plans call for mining 635 to 900 kt/a (700,000 to 1 million stpy) from three open pits. The ore would be leached on two pads. In October, the company received approval for an expanded exploration plan. The plan includes building 3657 m (12,000 ft) of new road and 27 drill pads that will be reclaimed.

In 1989, more than 120 reverse circulation holes were drilled and an extensive surface mapping and sampling project completed. To date, 529 holes have been drilled on the large claim block. Evaluation of all these data was still in progress late in the year.

Freeport McMoRan Gold postponed plans for gold exploration at Caribou Mountain (2987 m or 9800 ft elevation) located east of Grays Lake in southeastern Idaho. The weather and budgetary decisions were responsible for the postponement. Freeport had planned on upgrading the Barnes Creek road, constructing about 6400 m (21,000 ft) of

new road in two segments, and drilling 15 holes. Environmental groups protested road construction above the tree line on the mountain. A new road was planned at an elevation of 2804 m (9200 ft) and an extension of the Monte Cristo mine road, south past the Evergreen mine, would be at 2500 m (8200 ft). Gold was discovered on Caribou Mountain in the 1870s but the gold rush was over by 1890. Small scale mining continued sporadically up to the 1950s.

Cordex has optioned claims at Mink Creek south of Pocatello. The company mapped and performed geochemical sampling in 1989 and plan a drilling program for 1990. The precious metal target is hosted in Paleozoic sediments. Cordex also drilled a property at Robber Gulch, south of Twin Falls, this year but has since dropped the project.

Oglebay Norton did no further drilling for metals at its perlite mine but may do more this year.

Westgold continued exploration at its Oakley project on the west side of Middle Mountain in Cassia County. Eleven reverse circulation holes totaling 700 m (2300 ft) were drilled on this structurally complex, hot spring gold prospect hosted in Tertiary basin-fill clastics and altered Paleozoic carbonates.

Atlas Precious Metals staked 50 claims in Magpie Basin on Rock Creek in the South Hills near Twin Falls. The company is believed to be prospecting for a low-grade gold deposit.

### Southwest Idaho

Numerous geologists in unmarked company trucks were seen wandering the sagebrush-covered hills of northern Owyhee County and adjacent areas in eastern Oregon searching for deposits similar to Atlas' Grassy Mountain deposit a few miles west in Oregon. Grassy Mountain is a hot spring deposit hosted in clastic sediments interbedded with Middle to Late Tertiary volcanics.

Nerco Minerals continued developing the new Stone-Cabin mine on a 101-hm<sup>2</sup> (250-acre) site on Florida Mountain, which has been under exploration and development for several years. An Environmental Impact Statement on the new property is underway by CH2M Hill and BLM.

Identified reserves on Florida Mountain at the end of 1988 based on 60,960 m (200,000 ft) of drilling were 13.5 t (435,000 oz) of gold and 276.8 t (8.9 million oz) of silver. High-grade ore

will be milled at the Delamar mine, 8 km (5 miles) to the west, and low-grade ore will be leached on a 68.7-hm<sup>2</sup> (170-acre) site halfway between Delamar and Florida Mountain.

Nerco signed an agreement with War Eagle Mining for exploration of War Eagle's claims near Silver City. War Eagle shook the Vancouver Stock Exchange last year with an announced discovery that drove its stock from pennies to more than \$8 per share. Nerco plans on drilling about 15 holes this year. The first two of these holes intersected mineralization.

North American Silver was sold to Nerco Minerals. The company owned the Glen Silver open pit, which is part of the Delamar mine.

Gold Canyon Resources and Bradner Resources formed a partnership to develop the Blue Dog gold property near Weiser in Washington County. The partnership formed a joint venture with Homestake Mining, which controls the property. Previous drilling outlined 5.2 Mt (5.8 million st) of 0.9 g/t (0.025 oz per st) gold. A high-grade core zone contains 482 kt (532,000 st) of 3.2 g/t (0.092 oz per st) gold. Three diamond drill holes totalling about 228 m (750 ft) were completed this fall to test the high-grade core and extensions of the lower grade material. Results were encouraging. One hole had a 49-m (160-ft) section that averaged 2.4 g/t (0.071 oz per st) gold with a 4.5-m (15-ft) intercept of 8.9 g/t (0.258 oz per st) gold.

There was considerable activity near Indianhead close to Olds Ferry on the Idaho/Oregon border. Asarco leased a hot spring property from Western Epithermal. Following mapping, soil sampling, and one drill hole, Asarco returned the property. Asarco also evaluated another Western property southeast of Emmett and conducted a reconnaissance program in the Owyhee region.

Chevron Minerals leased, and then returned to Manville, properties at Indianhead and Thirsty Mountain. Manville drilled several holes at Indianhead and has since optioned the property to Battle Mountain Gold, who did surface work this year and plans a drilling program for next year.

Several companies actively explored or developed industrial mineral sites in Idaho during the year. FMC is developing a new phosphate mine in Dry Valley to replace the Gay mine that will soon be