IDAHO MINING AND EXPLORATION, 1989

Earl H. Bennett
Virginia S. Gillerman

Staff Report 26-03
August 2026

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

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See supplemental document S-26-03_suppl.pdf for the visual presentation on Idaho Mining and Exploration in 1989.

IDAHO MINING AND EXPLORATION, 1989

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INTRODUCTION

The purpose of this report is to summarize and describe all mining and mineral related activity in Idaho for 1989. Sources used to compile this document include U.S. Forest Service and Bureau of Land Management mineral specialists in the state, the U.S. Bureau of Mines, numerous company geologists and spokespersons, and clippings from area and trade newspapers and periodicals. Production figures for the active mining operations will be added to this report when available.

ACTIVE MINES AND PROCESSING PLANTS IN IDAHO

COEUR D'ALENE MINING DISTRICT

Asarco Inc.

Asarco operates the Coeur mine (owned by Coeur d'Alene Mines Corporation) and the Galena mine (owned by Callahan Mining Corporation). Both mines operated without interruption in 1989 despite low silver prices. The 3900 level of the Coeur was opened during the year. The mine employs about 150 people. The ore grade at the Galena mine was lower, continuing a trend started last year. About 225 people are employed at the Galena. A panel of state agencies concerned with the environment presented an award recognizing Asarco's efforts in reclaiming 60 acres of tailings from the Coeur and Galena mines.

Asarco obtained a 25-year lease on the Silver Summit mine and Polaris mill near Osburn. The Silver Summit mine was the site of a $17 million exploration program several years ago by Hecla Mining Company and Coeur d'Alene Mines Corporation (the Consolidated Silver Corporation). As part of this project, the Silver Summit shaft was sunk to 5,400 feet and considerable underground drilling was done. Asarco's plans for the ConSil were not known at year's end. The company will cooperate with scientists from the University of New Mexico, the University of California, and the Idaho National Engineering Laboratory (INEL), who are conducting a physics experiment in the mine studying subatomic particles called neutrinos. Asarco pledged $150,000 for the new College of Mines and Earth Resources Building at the University of Idaho.

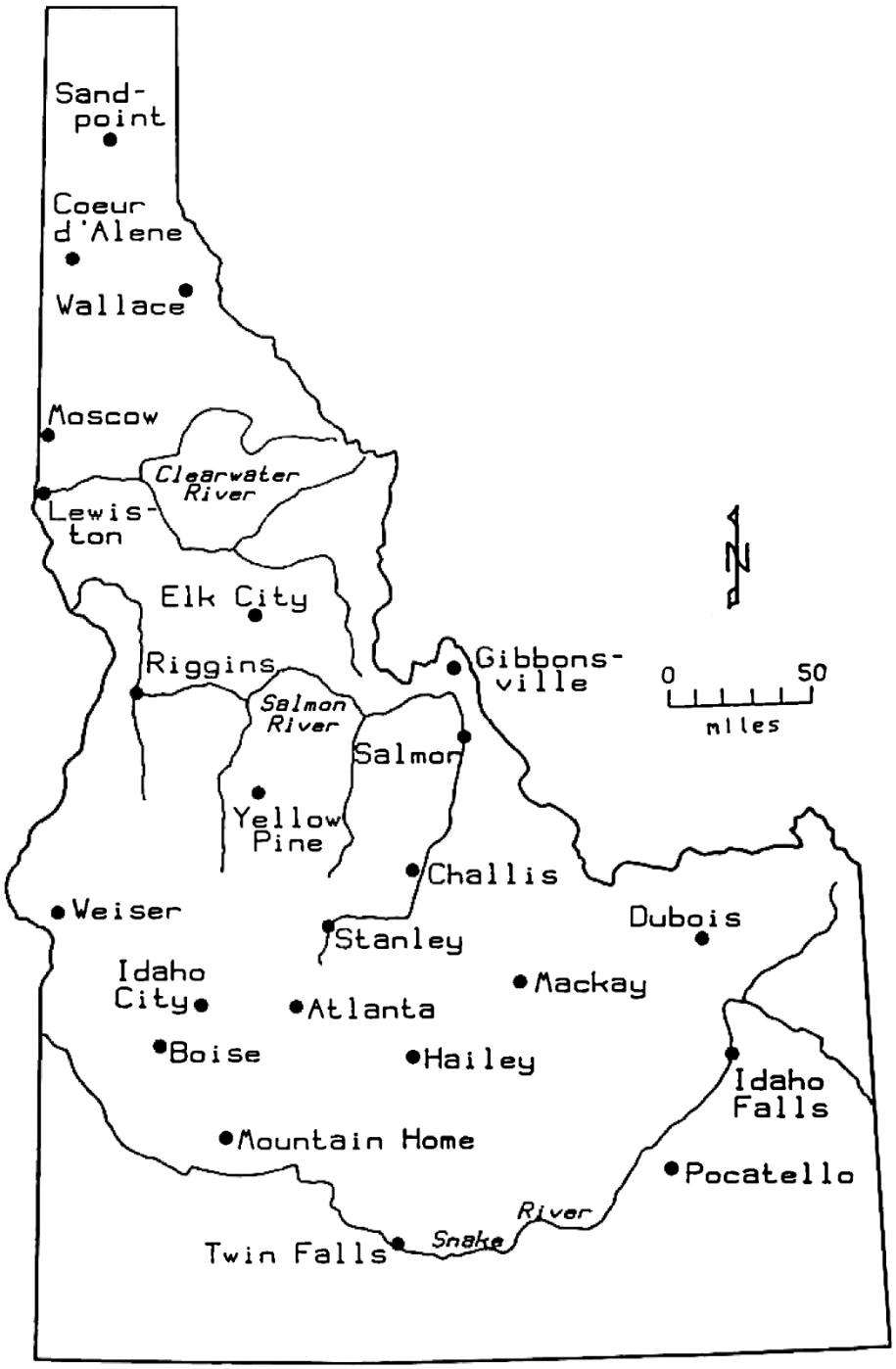

Figure 1. Location of selected cities and towns in Idaho.

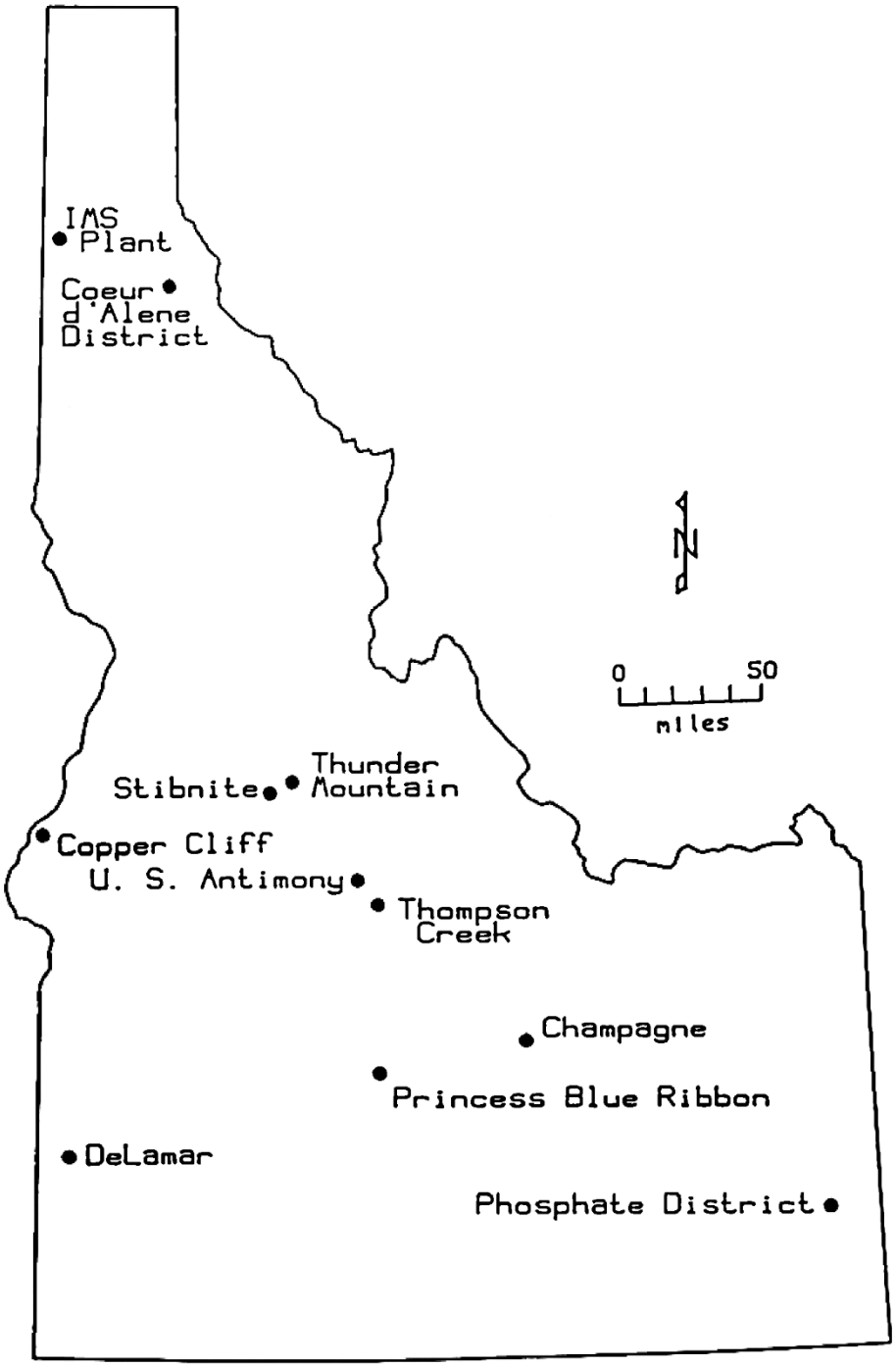

Figure 2. Active mines and processing plants in Idaho, 1989.

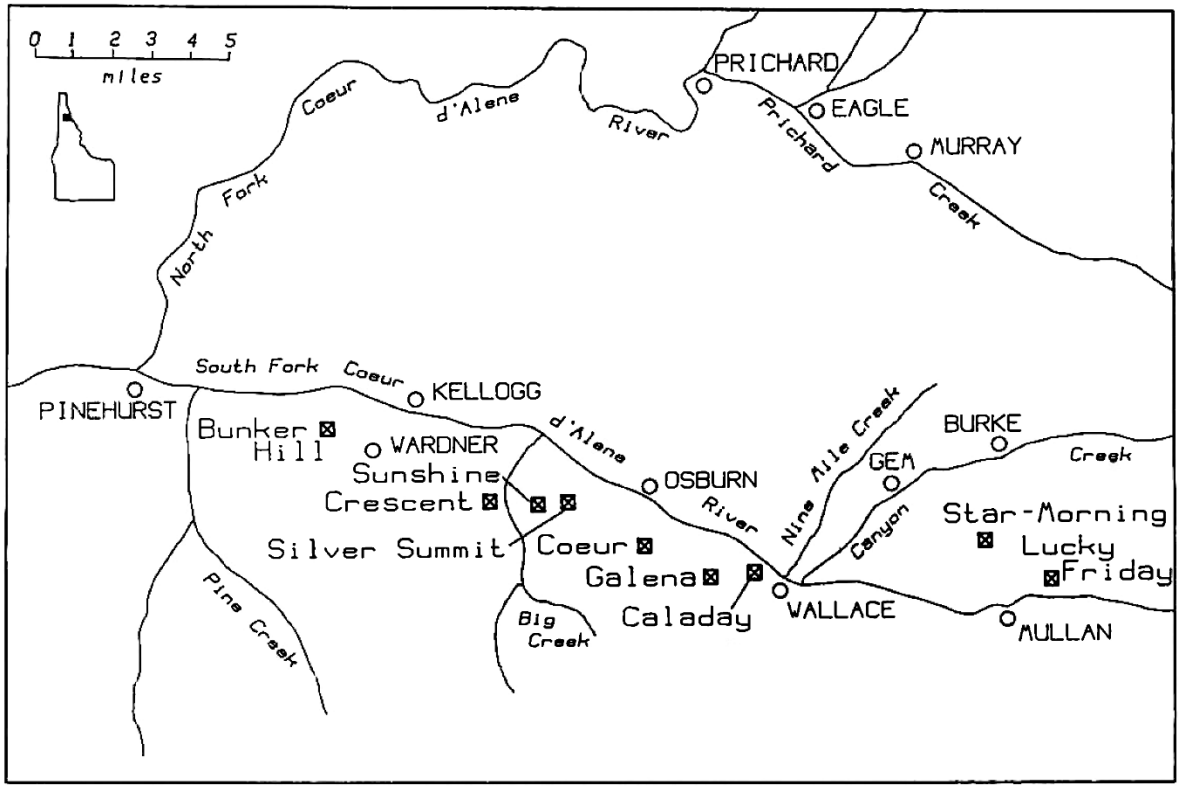

Figure 3. Coeur d'Alene Mining District.

Sunshine Mining Company

Quarterly losses continued for Sunshine Mining Company but were down from last year's red ink. In the third quarter, the company requested permission from the Securities and Exchange Commission to offer 5 million shares of common stock, bringing total outstanding shares to 97,178,539. Proceeds of the stock sale will be used for working capital and to reduce debt.

The company returned the Sunshine mine to full production in 1989. Sunshine anticipates production of over 5 million ounces of silver this year from the mine—a new all-time record. Production through the third quarter was 3.6 million ounces. The mine employs about 400 people. Despite the increased production, the low price of silver resulted in losses for the company.

Sunshine is a vertically integrated silver producer operating the Sunshine mine and refinery on Big Creek and a mint in Coeur d'Alene. The silver refinery reached full production for the first time since it was opened in 1984. Capacity is about 5 million ounces per year. The Sunshine mint received a long-term contract with the United States mint to produce 200,000 silver blanks that will be used to make the popular one-ounce Silver Eagle coins. The plant will generate about $12 million in revenue in 1989, up from $10.5 million last year. About 1.5 million ounces of silver were processed in 1989. The mint started a mail-order business for its silver products with a Christmas catalog entitled *Holiday Magic, 1989*.

Sunshine's plans for buying Rexene Corporation, a plastics firm, fell through early in the year. However, the company did buy into the Noxon silver project in Montana for about $30 million in

stock. Bond International Gold Inc. and Sunshine signed an exploration agreement covering 18,000 acres of land held by Sunshine in Nye County, Nevada.

Bunker Hill Mining Company Inc.

The Bunker Hill Mining Company Inc. turned a profit in the third quarter after losses in the early part of the year. The new company opened the big Bunker Hill mine last year and began shipping zinc concentrates to a smelter in Japan. The mine, at one time the largest lead/zinc mine in the United States, closed in 1981. The new Bunker Hill Company raised $8.5 million in 1988 to reopen the mine. About 1,600 tons of ore per day is currently being mined and the company may add miners to increase production next year. Eventually, about 3,000 tons of ore will be milled per day. Mining will be done by a new trackless bulk-mining method. Reserves at the mine are 9 million tons of ore with the hope of eventually proving 20 million tons, enough to operate for 30 years. Operating costs are estimated at about $25 per ton at peak production. A new $500,000 computerized real-time analyzer was installed in the third quarter to monitor concentrator throughput. Current production is from the Newgard 8-level stope. The company is non-union and employs 215 people. Zinc concentrates are currently being shipped to a smelter at Trail, B.C. Bunker Hill decided late in the year to contract for all future mining services. Faucett Mine Services was the successful bidder and will be responsible for all mining operations starting next year.

Bunker Hill Company shares are traded on the Vancouver, B.C., exchange and will soon trade on NASDAQ.

The Bunker Hill smelter is the heart of a 21-square-mile Superfund site contaminated by metals. Gulf Resources and Chemical Company, former owner of the complex before it closed, announced in October that a $150 million fund would be maintained to pay for the cleanup. This summer, metal contaminated soil was removed from about 40 homes in the site and lawns replanted. Late in the year EPA ordered a rare, immediate-emergency cleanup of hazardous materials at the smelter, citing significant risk to public health. The order called for limiting access to the 350-acre smelter site, stabilizing dust piles and storage tanks that contain sulfuric acid and mercury sludge, posting hazardous substance warnings, and halting demolition and salvage from old buildings that contain asbestos.

Star Phoenix Mining Company

In August, Star Phoenix Mining Company, formed by Frank Duval and the partners in the Bunker Hill Limited Partnership, began reopening the Star Morning mine closed in 1982 by Hecla Mining Company. The lease with option to buy will give Hecla 35 percent of profits. The Star-Morning is 7,900 feet deep and is the deepest mine in the United States. This is the same depth as Hells Canyon, the deepest gorge in North America. The mine is actually two mines: the Star on the west is a zinc mine and the Morning on the east is a lead/silver mine. Both are on the same vein system which is about 4,900 feet long. The old Hecla mine at Burke, which closed in the 1940s, is also part of the complex but is on a different vein system.

The Star will be mined for zinc which has been selling for near record prices lately. The cost of reopening the mine is estimated at $750,000. The 1,250 tpd capacity, 52-year-old mill at Burke is being refurbished and new flotation cells are being installed. About 75 people are involved in reopening the mine. Production should start next February. A new mining method will use rubber-

tired diesel equipment. Production will be at 3,000 tons-per-day, up from about 1,200 tons-per-day when the mine closed. A long tunnel is being driven from near Mullan to the 700 level of the mine and the No.5 shaft is being raised.

Coeur d'Alene Mines Corporation

Coeur d'Alene Mines Corporation (Cda) was profitable in the third quarter with record gold production leading the way (67,607 ounces versus 54,381 in 1988 for three quarters). The company owns the Coeur mine in the Silver Valley and the Rochester mine in Nevada, the largest heap-leach silver mine in the world. A decrease in gold production at Thunder Mountain, a gold mine in central Idaho, was offset by increased recovery at Rochester. Silver production was down in 1989. Company profits for the year were improved by silver and gold contracts sold forward last year. Cda Mines received the Platinum award for Corporate Excellence from the Northwest Mining Association. The company continued a joint exploration venture with Echo Bay Mines Ltd. (the operator) at the Kensington mine in Alaska. The Kensington vein was intersected early in the year in a mile-long adit. Cda Mines donated $250,000 over a 5-year period to the College of Mines and Earth Resources for the new Earth Resources building at the University of Idaho.

Callahan Mining Corporation

Callahan Mining Corporation reported losses this year due to decreased silver grades at the Galena mine, low silver prices, and the closure of the Ropes Gold mine in Michigan in October due to ground control problems. Silver revenues through the third quarter from the Coeur and Galena slipped from $1.5 million in 1988 to $493,000 this year. Exploration continued at the Caladay project adjacent to the Galena mine.

Hecla Mining Company

Hecla Mining Company suffered a loss in the third quarter due to start-up costs at the Greens Creek mine in Alaska (operated by BP Minerals). The company continued operation of the Lucky Friday mine in the Silver Valley. Production was helped by the new mining method called the Lucky Friday Underhand Long Wall method. Cash flow from the mine is positive but low silver prices will result in a net loss for the Friday for the year.

Hecla raised about $62 million from the sale of $175 million in Liquid Yield Option Notes (Lyons) due in 2004. The money was used to repay $40 million in outstanding bank loans and for other corporate purposes.

The company purchased kaolin mines and plants at Deepstep and Sanderville, Georgia, and Aiken, South Carolina, from Cyprus Minerals Company for $11.2 million. The new acquisitions produce about 20,000 tons of kaolin annually. The purchase makes Hecla one of the largest clay producers in the U.S. The company's sales of industrial minerals were up 31 percent over last year's three-quarters figure, but profits were down.

Hecla purchased and reopened the Apex mine (located near St. George, Utah) from Musto Explorations for $5.5 million in March. The mine is a past producer of gallium and germanium. The property compliments Hecla's move into rare earths which includes the Sarfartoq property in Greenland and possible rare-earth production from the Thor Lake beryllium project in Canada.

In June, the company celebrated mining the 2-millionth ounce of gold from the Republic Gold mine near Republic, Washington. The record covers a 47-year history. Plans call for expanding production at the mine, which is the flagship of Hecla's empire, with a new shaft and mill. Exploration in 1989 centered on the Golden Promise area and the Golden Eagle discovery. A new 4,000-foot-long ramp will be developed at the mine to open up the Golden Promise vein. Cost of the ramp and other underground work is estimated at $6.6 million. Mining costs at Republic are about $100 per ounce of gold.

Hecla donated $20,000 to the city of Mullan for materials used to create the John Mullan Centennial Park. The company's Lucky Friday mine is near the town. The company also pledged $150,000 for the new Earth Resources building at the University of Idaho.

OTHER PRODUCING METAL MINES

Cyprus Minerals Company

Cyprus Minerals' huge Thompson Creek mine continued to rebound from the slump of 1987 when it operated at 20 percent capacity. The mine will produce about 15-16 million pounds of molybdenum disulfide in 1989, up from 14 million in 1988 (75 percent capacity). Thompson Creek operated at nearly 100 percent in September for the first time in almost six years. The mine and 30,000 tons-per-day mill are operated by a 380-person labor force. Top employment was about 500 in 1983. Open pit mining is done with nineteen 170-ton trucks, five 120-ton trucks, and five 17-cubic-yard electric shovels. Reserves at the mine are 161 million tons of 0.11 pounds-per-ton molybdenum. Cyprus donated $150,000 for the McClure Library which will be part of the new Earth Resources Center at the University of Idaho.

A new high-purity lubricant-grade moly disulfide plant was completed at the mine at a cost of $2 million. Cyprus has done an excellent job in capturing a major share of the lubricants market and the new plant will expand the company's ability to produce high-quality products. The Bonneville Power Administration helped the company with lower power rates that will save several hundreds of thousands of dollars over the 2 ½ year contract. Although recovering strongly in 1989, a world glut of molybdenum forced a two-week mine closure at Thompson Creek late in the year. Codelco, the government owned mining company in Chile, lowered molybdenum prices from $3.00 to $2.50 per pound and threatened even lower prices in response to the oversupply problem.

Nerco Minerals Company

Nerco Minerals continued with full production from the vat-leach plant and heap-leach facility at the Delamar mine. Production in 1988 was about 1.7 million ounces of silver and 29,000 ounces of gold from the two plants. Nerco went public in 1989 selling 4.75 million shares of stock at $17 per share. This raised $78.5 million. Two million shares were sold to PacificCorp, parent of Nerco, and the remainder were sold domestically and abroad.

Coeur d'Alene Mines Corporation

Coeur d'Alene Mines Corporation obtained 17,000 ounces of gold (compared to 24,250 ounces in 1988) from the Thunder Mountain heap leach gold mine in Valley County. The mine is owned by Thunder Mountain Gold Inc. The mine received a joint state-federal award for sound environmental practices, as it did last year.

Pioneer Metals Corporation

Pioneer Metals planned on processing 880,000 tons of ore averaging 0.037 ounces-per-ton gold during the '89 season which started in May at its Stibnite heap-leach gold operation. Exploration during 1988 increased reserves at the mine to 3,175,000 st grading 0.04 gold. This ensures operation at current levels for four more years. D.H. Blattner and Sons of Avon, Minn. outbid Gilbert Western Construction for the mining contract for this year which employs 80-90 people. Pegasus Gold increased its stake in Pioneer to almost 8 percent and holds warrants that, if exercised, would increase Pegasus' interest to 20 percent.

Alta Gold Inc.

Alta Gold Inc. and Pacific Silver Corporation opened the Copper Cliffs mine and 600 ton-per-day mill in Adams County. The former copper producer operated until 1981 when low copper prices shut the mine. Plans call for extracting 3 million pounds of copper over the next two years, the projected life of the mine. About 90,000 tons of ore grading 1% copper were mined and milled in 1989. Thirty workers were employed at the operation. One-third of the anticipated production from the mine has been sold forward to Prudential Bache. The companies are also looking at the Iron Dyke mine across the Snake River in Oregon. That mine ceased operation in 1984. Ore from the Iron Dyke was processed at the Copper Cliffs mill.

Idaho Gold Corporation

Idaho Gold Corporation (a subsidiary of BEMA Gold Inc.) began processing ore in June and dedicated its new Champagne mine in the Lava Creek district (located 20 miles west of Arco) in September. The open-pit, heap-leach gold mine is on the site of the former Horn Silver mine worked from 1883 to the 1930s. The property was explored by Phelps Dodge Corporation and Gold Fields Mining until taken over a few years ago by BEMA. Preproduction costs for the new mine were about $2 million. An open house was held at the mine in October. At the time, the leach pad contained 400,000 tons of ore and the mine was in full production. The operation employs 56 people with a normal workforce of about 40. About 16,000 tons of rock are moved daily divided 50/50 between waste rock and ore. The mine will process about 800,000 tons of ore per year yielding 20-25,000 ounces of gold. Average ore grade is 0.02 ounces of gold and 0.80 ounces of silver per ton. The mine has reserves for 3.5 years of operation with a potential for 5-10 years. The operation is expected to produce 17,500 ounces of gold this year at an average cost of $150 per ounce. BEMA sold $2.8 million worth of stock in Europe to finance the Champagne mine. The company has done an excellent job of public relations hosting at least three open houses.

U.S. Antimony Corporation

U.S. Antimony Corporation began a 50-tpd operation at the Specimen mine located north of Lowman. Mining concentrated on a zone containing 22,413 tons of 0.38 ounce-per-ton gold and 0.13 ounce-per-ton silver. About 300 tons of ore were trucked to USAC's mill at Preachers Cove on the Yankee Fork for processing. The company also processed about 3,500 ounces of gold at the Preachers Cove mill from the General Custer mine in Custer County.

Precious Metals Technology

Precious Metals Technology operated the mill at the Princess Blue Ribbon mine all year. Little ore was processed from the Blue Ribbon mine itself, however, the company is hauling gold-bearing ore from the Camas mine (Hailey gold belt) to the Blue Ribbon mill.

Placer Mines

A and T Mining operates the largest gold placer in the state, continued operations near Lucille. The company is opening up new gravels on Butcher Bar.

A new placer was started at the Old Pan mine near Pierce. It is operated by Clark Callear. Blackbear Mining continued work at a placer up Independence Creek (Moose Creek area) at 50 yds/day.

George Castle is starting work at the Twin Springs placer in Elmore County. He has put a bridge across Browns Creek and has a large trommel on site. Three settling ponds are completed.

ABC Mining has a placer operation going on Buckskin Creek near Idaho City.

PHOSPHATE MINES AND PLANTS

Production of phosphate rock in the United States for crop year 1989 increased to 49.7 million metric tons, up 15 percent from last year according to the U.S. Bureau of Mines. Exports of rock were 8.5 million tons or 7 percent more than last year. The value of rock increased from $24.08 per ton last year to $27.38 per ton this year.

A continuing drought in the mid-west resulted in soft markets that hurt Idaho's fertilizer manufacturers' profits. Despite market problems, Nu-West and J.R. Simplot maintained full production. The elemental phosphorus market was stable in 1989 and both FMC and Monsanto operated normally.

FMC Corporation

New Environmental Protection Agency (EPA) standards threaten to make obsolete some of the $8 million in new emission equipment installed over the past two years at FMC's elemental phosphorus plant in Pocatello, the largest in the world. The new equipment was designed to meet EPA's standards set in 1985. FMC spokesmen say it will cost $13.2 to install new venturi scrubbers on its calciners and $1.7 million for annual maintenance to meet the new regulations. EPA's new standards for radioactive emissions from the plant's stacks go too far according to Senator James McClure, who noted that FMC's problems could have serious economic repercussions for southeast Idaho. Despite these protests, EPA was standing by its decision at year's end. FMC will have 90 days to comply with the new standards.

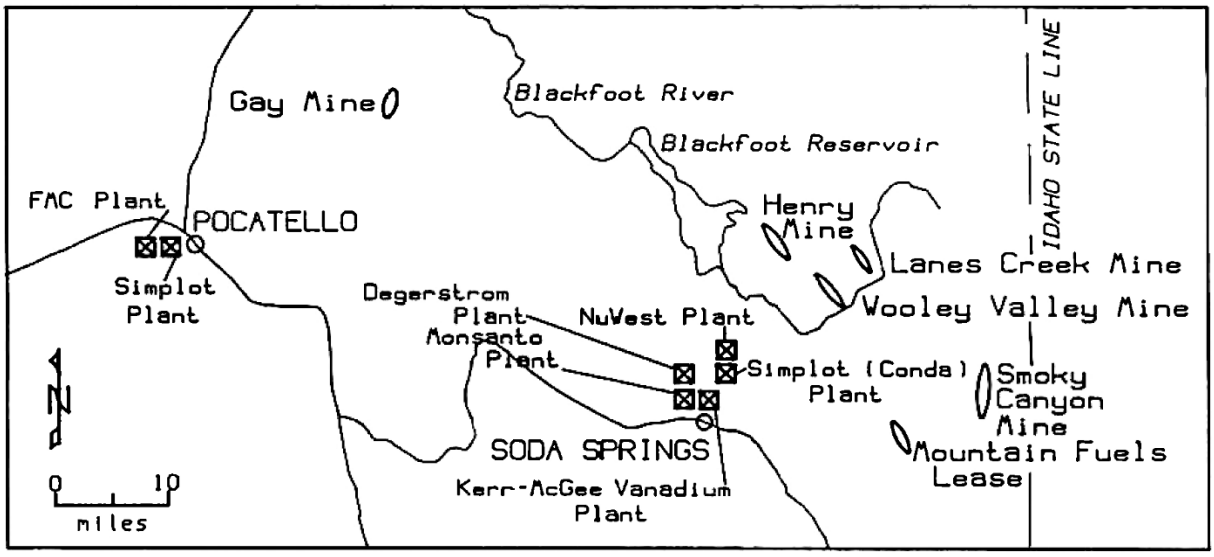

Figure 4. Phosphate mines and plants.

The Idaho Department of Health and Welfare issued a notice of air pollution standards violations to FMC in March and levied a $12,000 fine against the company.

A new stacker-reclaimer for handling phosphate ore was completed at the plant early in the year. The equipment is much more efficient than using bulldozers to handle stock piles and cuts down on dust pollution.

Work started on a new phosphate mine in Dry Valley which will replace dwindling reserves at the Gay mine. The mine site covers 770-acres and is expected to employ about 132 people when it reaches full production of 1.5 million tons of ore per year in 1994. The mine life is expected to be 15 years, and the company holds other leases in the area. Closure of the Gay mine (operated by J.R. Simplot for both Simplot and FMC) on the Fort Hall Indian Reservation will have a dramatic impact on employment for the Shoshone and Bannock tribes and will cost about 190 jobs.

A new three-year contract was signed in May between FMC and the Machinists Union which represents some 400 workers at the Pocatello plant. The contract calls for a $1,250 cash bonus per employee and annual raises. FMC offered about 30 salaried and hourly senior employees incentives for early retirement as part of a plan to cut about 5 percent of the payroll at Pocatello.

FMC purchased four modules for use in Pocatello area schools as part of a cooperative industry/Department of Education program. The modules will be used to promote an understanding of man's use of chemicals and the effects of chemicals on our daily lives. The program is part of the Department of Education's Chemical Education for Public Understanding Program (CEPUP) and is the first of its kind in Idaho.

Monsanto Company

The Henry mine, source of about one million tons of phosphate ore per year for Monsanto's elemental phosphorus plant in Soda Springs, received an environmental award. The award, in recognition of the company's outstanding reclamation efforts at the 1,500 acre mine site, was

presented by Governor Cecil D. Andrus for the State Land Board. The company reclaims about 70 acres per year and spends an estimated $1,000 per acre. The Henry mine will be mined out this year and the company will move to a new site in Enoch Valley, four miles east of the old mine site. Reserves at the new mine will last about 15 years and the site will be reclaimed.

Kerr-McGee

Kerr-McGee completed a 30 percent expansion early in the year which will boost annual vanadium production at its Soda Springs plant to 4.3 million pounds. Increase in demand for vanadium as a steel additive and the development of several new products by Kerr McGee in 1986 sparked the expansion. The company is the largest vanadium producer in the country and extracts the metal from ferrophosphorus slag, a waste product from Monsanto's elemental phosphorus plant located across the road from Kerr McGee. About 60 people are employed at the Kerr McGee plant which has been in operation since 1963.

The vanadium plant site had the dubious distinction of being added to EPA's superfund sites, the fifth such location in Idaho. Groundwater contamination by vanadium, arsenic, copper, and silver on the 158-acre plant complex is a major concern.

Nu-West Industries Inc.

Nu-West continued with full production from its fertilizer plant at Conda. The company reopened the bankrupt facility in 1987 after buying it for $50 million. About 200 people work at the plant while an additional 45 work at the adjacent calcining plant owned by Conda Partnership (a joint venture between Nu-West and Western Cooperative Fertilizer Corporation of Canada). Another 150 work for Washington Construction, a contractor at the company's phosphate mine in Dry Valley. The fertilizer plant produces about 300,000 tons of P_2O_5 annually and has increased its production of super phosphoric acid from 10,000 to 15,000 tons per month. A planned $35 million cogeneration plant at Conda is under study. A new mine is under development on Dry Ridge.

Nu-West alleviated cash flow problems by obtaining a $31 million loan, secured by its Conda phosphate fertilizer operation, from General Electric Capital Corporation. Nu-South Industries and Nu-Gulf Industries idled operations in mid-year due to liquidity problems at Nu-South's Pascagoula, Mississippi, operation. The plant is being refitted as a wet-process fertilizer plant that can use phosphate ore from the Wingate mine in Florida rather than using imported ore from Morocco. The Pascagoula plant and the Wingate phosphate mine were purchased by Nu-South and Nu-Gulf last year and are reportedly for sale.

J.R. Simplot Company

J.R. Simplot Company continued full operation at its fertilizer plant in Pocatello located next to FMC's plant. The company mines about 2 million tons of phosphate ore per year from its Smoky Canyon mine located near the Idaho-Wyoming border. The phosphate ore is slurried and then pumped to a calcining plant at Conda via a 27-mile-long slurry pipeline. Simplot plans on building a 9-inch diameter, 58-mile-long slurry line from Conda to Pocatello at a cost of some $30 million. Construction will start in 1991. The fertilizer plant at Pocatello employs about 550 people and produces about 400,000 tons of phosphate fertilizer per year. A $50 million plant expansion and modernization was completed several years ago.

In November, EPA ordered the company to cut back on sulfur dioxide and particulate emissions from the Pocatello plant or face fines of up to $25,000 per day for non-compliance. Dust problems will be solved by the pipeline and Simplot is working on the other complaints.

Stauffer Chemical Company

Stauffer (a subsidiary of Rhone-Poulenc Basic Chemical Company) mined about 425,000 tons of ore from the Wooly Valley mine. The company is completing a new washing plant at the mine site and will ship washed ore next year. About 40 people are employed in the mining operation. The ore is sent to the company's elemental phosphorus plant at Silver Bow, Montana. Most of the phosphorus is used by other Rhone-Poulenc industries.

N.A. Degerstrom Inc.

N.A. Degerstrom completed construction of a plant in Soda Springs to extract gallium and silver from treater dust, a waste product from Monsanto's nearby elemental phosphorus plant. The plant will employ 20 people. Gallium is in demand by the electronics industry and is used to make gallium arsenide computer chips. The plant is scheduled for startup next year.

Other Phosphate News

Scientists with EG & G, prime contractor for the Idaho National Engineering Laboratory, have developed a technique for extracting elemental phosphorus from phosphate ore by using a cyclone gas plasma reactor. The new technology uses a gas plasma that produces very high temperatures. The new reactor would replace the vertical furnaces now used by elemental phosphorus plants and could reduce costs and environmental problems.

Nine north Idaho towns in Bonner County, including Sandpoint, Kootenai, Ponderay, East Hope, Hope, and Priest River, and finally, Bonner County itself, adopted bans on using phosphate laundry detergents in March, just days before the Idaho Legislature passed the Nutrient Management Act that restricts cities from imposing such bans.

North Idaho officials were upset about the act which they felt eroded local authority. Retailers had six months to clear their shelves of detergents under the new bans. The cities are concerned about pollution of Lake Pend Oreille and other north Idaho lakes and rivers. The phosphate industry contended that the detergents were not the source of pollution and supported the legislative action. Public concern about phosphate pollution continued at year's end with towns in Kootenai County including Post Falls, Coeur d'Alene, Rathdrum, Hayden, and Hayden Lake, considering phosphate bans. Spokane and Liberty Lake in Washington will take up the issue next year. The effects of possible phosphate contamination of Lake Coeur d'Alene, the Spokane River, and other lakes are of concern to these cities. Post Falls took steps to approve a ban in December. About 70 percent of the elemental phosphorus that eventually goes into this country's detergents comes from southeast Idaho.

INDUSTRIAL MINERALS

Limestone

Ash Grove Cement, the state's only cement producer, had one of its best years ever in 1989, shipping over 200,000 tons of cement. In addition, Ash Grove exceeded 2,430 days without a lost-

time accident and again was recognized by the Portland Cement Association for its fine safety record. The plant employs about 75 people. Limestone and quartzite, used in making cement, are quarried from near the plant at Inkom.

Faxe Kalk, a Danish industrial minerals company, purchased the 5,000 acre Morning Glory limestone deposit from E.J. Wilson and Sons. Wilson will operate the mine and crush limestone to -325 mesh for shipment to various paper mills in the mid-west and on the west coast. The primary use of the very pure and bright limestone will be for paper filler and coating pigment. Faxe Kalk is a primary supplier of chalk for paper filler in Europe. The company is part of the FLS and Aalborg Portland Groups, two large Danish companies.

The Idaho Lime Company completed construction of a new $2.5 million filler plant at Grangeville. The plant will process pure limestone from a quarry near Lucille in the Martin Bridge Formation. The plant uses a ring-roller mill, Bradley Pulverizer, and air classifier to produce fine lime for filler for the paper, plastics, and paint industries.

The Nez Perce tribe shipped about 10,000 tons of limestone from their Mission Creek quarry to Potlatch Corporation's paper plant at Lewiston. The operation employs 3-5 people at the mine and another three people in trucking. The tribe also sold about 3,000 tons of agricultural lime, a business they would like to expand.

Howard Engineering evaluated a limestone deposit located near Leslie (between Arco and Mackay) for use by the sugar beet industry (Amalgamated Sugar).

Treasure Canyon Calcium Company Inc. shipped about 25,000 tons of limestone to the J.R. Simplot fertilizer plant in Pocatello. The limestone is used in animal feed. The company has 13 employees.

Idaho Travertine did not quarry any travertine this year from its pits located east of Idaho Falls. The travertine is used as a facing stone for building construction. The company's 25 employees continued to cut building facing stone at its plant in Idaho Falls using imported rock.

Silica

Unimin Corporation, the largest silica producer in the United States, continued normal production at its plant near Emmett. The company obtains silica sand from pits in Pliocene lakebed deposits on Freeze Out Hill. About half of the sand is used for glass making and the rest for sand blasting. The company mines all year and runs the mill about six months, employing 8-12 people.

Diatomite

Grefco Inc. continued an assessment and drilling program at a diatomite deposit near Deep Creek in Owyhee County. The company has a unique exploration approach, drilling 30-inch holes up to several hundred feet deep. A geologist is then lowered down the hole to examine the deposit and geology.

Grefco drilled one hole at the American Diatomite deposit located north of Gooding. The property has been under development for several years.

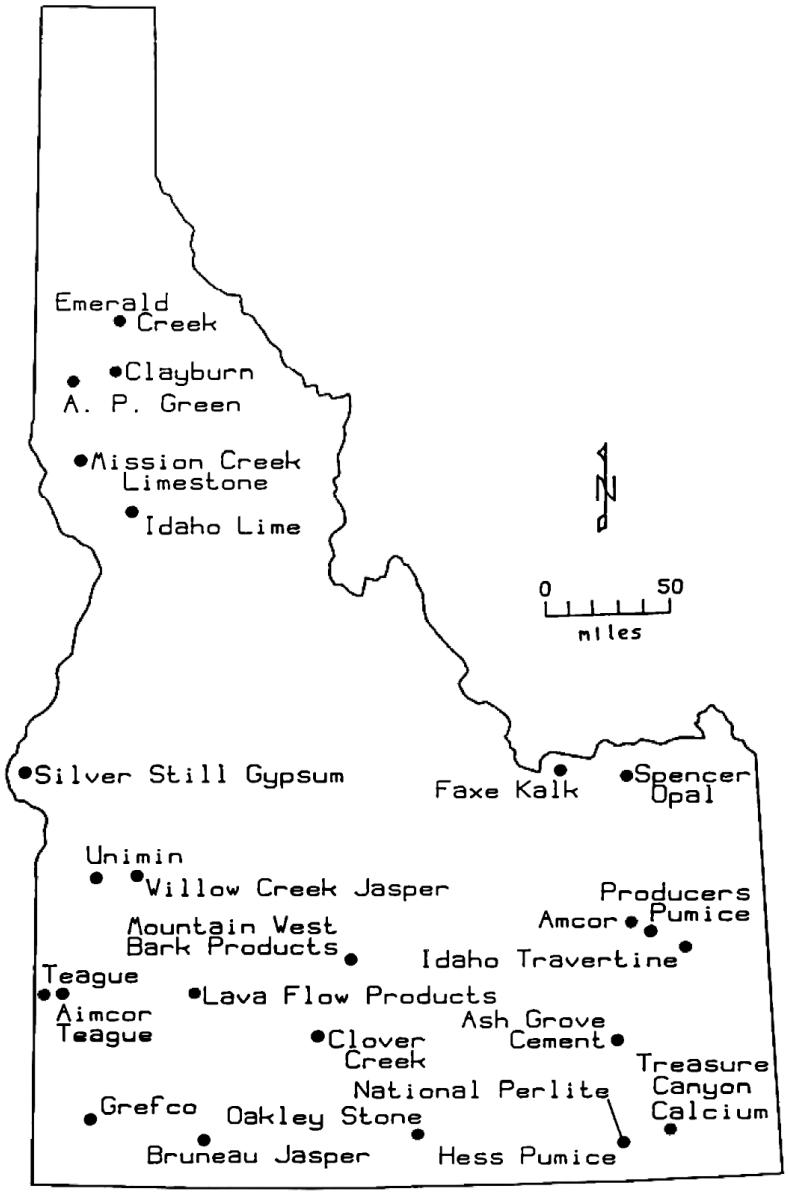

Figure 5. Industrial mineral mines and plants.

The Exxon Valdez oil spill in Alaska prompted a Lewiston based firm, All American Soil Company, to offer to sell at cost 50,000 tons of their diatomite-based product called Idasorb to help clean up the mess. The company holds leases on 1,400 acres of diatomite bearing land located about 15-miles north of Weiser and is marketing diatomite products in the Pacific Northwest.

Pumice and Perlite

Hess Pumice shipped about 15,000 tons of fine-grained pumice from its plant in Malad. The company also shipped about 300 tons to Japan in search of new markets. The fine-ground pumice has a wide variety of uses as a polishing medium and abrasive.

For example, pumice is used to polish TV picture tubes and in Lava hand soap. Hess also sells pumice for light-weight aggregate. The company has about 30 employees and mines pumice from the Wrights Creek mine located north of Malad.

National Perlite, a division of Oglebay Norton, almost doubled output in 1989 from its perlite operation in Malad. A new load-out was completed at the mine last year. New dust control equipment was installed at the plant and the office building modernized this year. The company ships about 75 percent crude perlite and 25 percent expanded perlite. National employs 24 people in the mining and plant operations.

Amcor Inc. mined about 11,000 tons of pumice from the Sunnyside pit near Idaho Falls. The company employs three men in mining and, as this was a slow year, they only mined for about six weeks. All of the pumice is used for light-weight aggregate.

Producers Products, a subsidiary of Builders Masonry Products in Meridian, purchased Producers Pumice in 1988. The company mined about 18,500 tons of pumice from the Rock Hollow mine near Idaho Falls in 1989. All of the product is used for light-weight aggregate. The company employs two men in the mining operation which is active about 10 months a year.

Garnet

Emerald Creek Garnet continued full production as the nation's largest garnet producer. Two Bureau of Land Management leases totaling 67 acres were added to the company's land holdings this year. The company mines garnet from Carpenter and Emerald Creeks using five washing plants. About 26,000 tons of finished garnet product were shipped in 1989. The garnet is used for sand blasting and for filtration. A lot of the garnet is used as an abrasive to clean and etch oil-well casing in preparation for applying a plastic coating that greatly extends the life of the casing. This year, a new shop was built at the plant site. The company built a new jig plant and modernized its sizing and bagging plant last year.

Clay

A.P. Greene mined about 2,000 tons of clay from pits near Helmer for its refractory brick plant located at Troy. This is a reduction from the 5,000 tons mined last year. The company sells all of its products through a broker. E.J. Bartels has been the company's exclusive sales outlet. A.P. Greene decided to change brokers this year and suffered a decline in sales while looking for a new marketing firm. The Troy plant also experienced some labor problems during the year.

Clayburn Industries mined about 1,700 tons of clay from the old Simplot plant near Deary. The clay is calcined at Deary and then shipped to Clayburn's plant at Abbotsford, B.C., where it is used to make fire brick.

Scoria

Mountain West Bark Products mined about 42-45,000 tons of scoria from pits near Rexburg and Soda Springs. The material is used primarily for landscaping. The company subcontracts for crushing and employs two people.

Lava Flow Products enjoyed a good year, shipping some 18,000 tons of scoria for use in landscaping, as aquarium gravel, and for gas barbecue briquets. The company markets its products

nationally and even shipped some scoria to Taiwan and Australia. The seasonal operation in Mountain Home employs about 30 people.

Gypsum

Silver Still Mining Company did not mine gypsum from the Iron Mountain Deposit near Weiser in 1989 but did sell about 2,500 tons from a stockpile. The company markets the gypsum for agricultural applications. Plans call for mining about 3,500 to 4,000 tons next year using a six-person crew.

Stone

Three companies expanded production of Oakley stone. The attractive quartzite is used as a paving and facing stone and sells for $100-$300 per ton. The largest producer is Idaho Quartzite Corporation which ships not only facing stone but also sawed tiles. The company patented the Amy-Ashly quarry. Northern Stone Supply operated the Rocky Mountain Quartzite Quarry and Oakley Valley Stone also sold stone in 1989.

Gemstones

Gemstone production in the state included: opal (Spencer Opal, Idaho Falls), jasper (Bruneau Jasper from mines in Bruneau Canyon and Willow Creek Jasper from near Pearl), garnet (U.S. Forest Service, St. Maries Ranger Station, fee areas near Emerald Creek, and Louise Darby, Moscow, 3-D's Panhandle Gems). Collectors were also active in the Sawtooth Range looking for smoky quartz and beryl crystals.

Aluminum Recycling Plant

IMSAMET Inc. dedicated its used beverage can (UBC) plant on a 29-acre site near Hauser Lake in May. Recycling aluminum cans has become an important part of the aluminum industry. About 40 percent of newly produced sheet aluminum goes into making cans. The new "state of the art" plant is in two buildings: one (44,000 square feet) houses the remelting operation, and the other (36,000 square feet) holds the dross recovery system. The plant is one of the most modern in the world and represents an investment of about $15 million. Equipment includes reverberatory and rotary furnaces for processing the aluminum and a baghouse and stack monitoring system for environmental control. The flow sheet of the plant is as follows:

- Aluminum cans arrive in 650-pound bales.
- A 350 hp crusher separates the baled cans and inspectors remove foreign material.
- A series of electromagnets remove iron.
- The cans are delacquered in a 1,200-degree oven.
- The cans are then mixed with salt and potash flux and melted in two 1,400-degree furnaces that hold 150,000 pounds each.
- The molten aluminum is poured into 15,000-pound crucibles called sows which are then trucked two at a time to Kaiser Aluminum's Trentwood plant near Spokane.
- The byproduct material called dross moves on to another part of the plant where more aluminum is extracted and sent to Kaiser's plant. The waste product called salt cake is then shipped to Utah for disposal.

About 80 million pounds of USC's and 40,000 pounds of other aluminum scrap will be processed per year. The plant employs about 70 people.

Zeolites

Teague Mineral Products mined a few thousand tons of zeolite from pits near Sheaville in Owyhee County. The company hauls the zeolites to its processing plant at Adrian, Oregon. Most of the product is used as a carrier for fungicides, in odor control, and as an animal feed supplement. Teague is still developing a very high-grade deposit of zeolites near Oreana. The company obtained a $43,000 grant from the Environmental Protection Agency to investigate the use of zeolites for specialized water treatment applications.

Steelhead Resources contributed zeolite to researchers in Montana who tested the mineral for cleaning up pollution at the Berkley pit in Butte. The huge former copper producing area contains 11 billion gallons of water that is contaminated with copper, zinc, and other minerals. The metals are worth millions of dollars if a way can be found to extract them from the water. Zeolites are natural sieves that can filter out metals and other substances from liquids and gases. Steelhead owns large deposits of zeolite (primarily clinoptilolite) near Sheaville in southwest Idaho.

EXPLORATION

Exploration for precious metals dominated company efforts in Idaho in 1989. The number of active exploration projects in the state increased from 68 in 1988 to 82 this year (Figure 6). 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

Lucky Eagle Mines Ltd. (a joint venture between Hecla Mining Company (57 percent) and Agnico Eagle Mines Ltd. of Toronto) plan on spending 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 U.S. The new company's name is derived from Hecla's Lucky Friday mine and Agnico's Eagle gold mine.

Cimco Mining Corporation of Spokane, Washington, signed a joint venture agreement with the China National Nuclear Industry Corporation 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 startup in 1990.

The Viking Investment Corporation increased its ownership in Golden Chest Inc. by 120,000 shares. The company has a long-term lease on the historic Golden Chest mine near Murray, a

former gold producer. The 500-acre tract is part of a 6,000-acre joint venture project with Newmont Exploration Ltd. In June, Newmont applied for permits to construct 2,000 feet of road and drill a maximum of 8 reverse circulation holes on the Golden Chest property. Preliminary drilling results indicate reserves of 4.8 million tons averaging 0.043 ounces of gold per ton. Viking is 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 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 Company 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 Corporation 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 they 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 Company. 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.

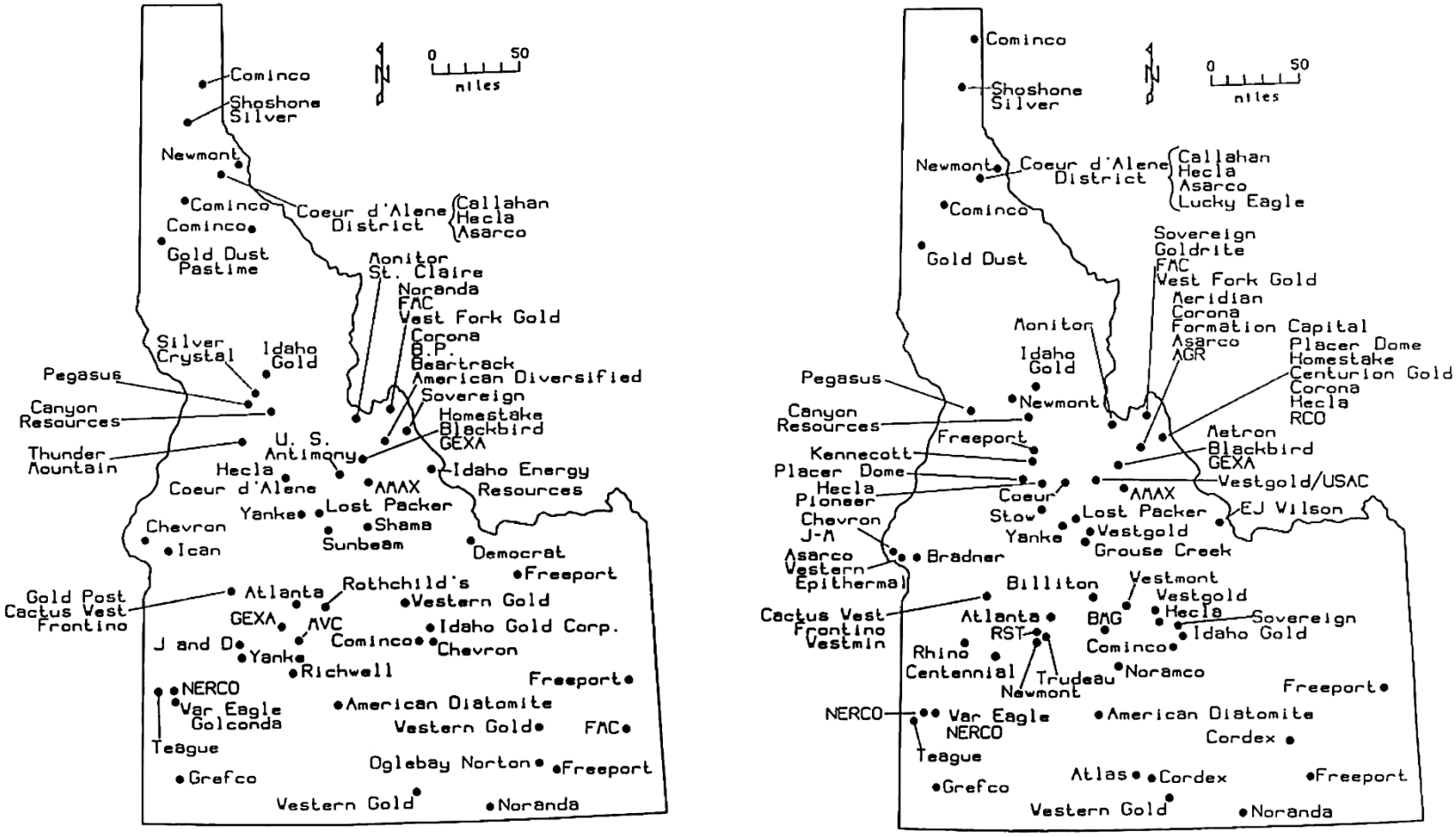

Figure 6. Exploration and development projects in Idaho in 1988 and 1989.

OTHER NORTH IDAHO

Cominco American Resources Company began work on over 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 3,000 feet, were drilled. Cominco is believed to be evaluating the polymetallic property for underground mining. The mine is at an elevation of about 5,800 feet.

Cominco also drilled 2 core holes at their 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 Hayden continued underground work at the Gold Dust mine in Mountain Gulch near Potlatch.

The U.S. Forest Service was busy this summer in the Gospel-Hump Wilderness doing validity exams on 131 claims staked before the wilderness area was officially withdrawn from mineral entry on December 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 this year. The property is adjacent to the Robinson Dyke mine where previous drilling has outlined a resource of about 800,000 tons of 0.042 ounces-per-ton 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 this summer.

Idaho Gold Corporation successfully tested an agglomerating system at the Buffalo Gulch heap-leach gold mine located 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 in 1990. The company also plans on developing a mine at Erickson Ridge, north of Buffalo Gulch. About 100 people will be employed at the operations.

SALMON AREA

Corona Gold Inc. drilled 33 reverse circulation holes on its 35-square-mile Bobcat Gulch (Smith Gulch) project in the Moose Creek Basin area of Lemhi County. The property was drilled as a copper-moly target by Cominco in 1980 and is now being looked at for precious metals. The claims are adjacent to the Beartrack discovery. Corona owns 75 percent of its joint venture with Formation Capital Corporation. Corona Gold is known for the development of the huge Hernia gold field in Canada.

Formation Capital is involved in an exploration venture with Corona and Hecla on a 400-claim block around the Queen of the Hill mine located west of Salmon. They 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 they control in the Salmon area. Surface work was conducted at Freeman Creek. The properties are Joint ventures with Broken Hill Proprietary Company.

Meridian Minerals Company continued exploration and development at the Beartrack property, the largest gold discovery ever made in Idaho. About 10,000 feet of core and over 200 reverse circulation holes were drilled in 1989 for a total of about 350 holes. To date, a reserve of 25 million tons of oxide ore containing 600,000 ounces of gold 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 over 500 feet deep and contains about 16.7 million tons of 0.068 ounce-per-ton gold while the North deposit contains 20.2 million tons of 0.044 ounce-per-ton gold (1988 figures). The company plans on producing about 80,000 ounces of gold per year. Reserves are believed sufficient for at least seven years of operation. About 100-150 people will be employed at the mine with an annual payroll of $3 to $4 million. Permitting is under way on the heap-leach mine which could start up in 1991-92. The Beartrack deposit also contains an estimated 2 million ounces of gold in sulfide ore. Canyon Resources, discoverer of Beartrack, is a 15-percent partner in the venture. An announcement in December that Burlington Resources, parent of Meridian Gold, would sell its gold 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. This year's work centered on the Little Chief mine. Ore grade mineralization has been found on four target areas on Arnett Creek. Last year, BP Minerals was a joint venture partner on this project but dropped their interest this year. Late in the year, Meridian Gold became a joint venture partner with AGR on the 17,000-acre property that adjoins the Beartrack claims to the east.

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

Sovereign Exploration (U.S. exploration subsidiary of Total Energold Corporation) drilled twelve diamond drill holes on the Gold Star property (2,480 acres) located on Tower Creek 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 their preliminary exploration at Musgrove Creek near Blackbird Mountain.

Goldrite U.S. 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 last year.

Charles Duus did only 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 this year on the West Fork of Indian Creek. The company plans on returning next year.

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

Metron Resources drilled about 6 holes this year on their Porphyry Ridge property. Homestake drilled the property last year and reportedly outlined 150,000 tons of 0.16 ounce-per-ton 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. They are trying to increase reserves so they can mine the property. This is a turnabout from last year when they were trying to joint-venture Ditch Creek.

FMC drilled 7 holes at Sage Creek and will drop the property.

RCO Resources began cleanup 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 this year.

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 Company has 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 Gaga mines in the Lemhi Pass thorium area. Most of the work was done on the Montana side of the state line.

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

The Democrat Mine at Gilmore was inactive this year due to low metal prices.

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

Noranda Inc. and M. A. Hanna Company announced an agreement in September to sell the Blackbird mine to Blackbird Metals Inc. Blackbird, headed by Mr. Chalmers Dale, planned to purchase the property last year but it was widely believed that this deal had fallen through. Dale planned an ambitious program requiring about $90 million to start up the mine and build a cobalt refinery. Production from the refinery was estimated at 5,000 tons of cobalt per year with about half coming from the Blackbird mine and the rest from scrap. The United States uses about 9,000 tons of cobalt per year. Last year, Mr. Dale made an agreement to pay the state of Idaho $7 million to help clean up Blackbird Creek which has been heavily polluted by past mining practices. Mr. Dale later backed out of the deal, claiming that the state might not use the money to clean up the creek. Noranda owns 85 percent of the Blackbird mine and Hanna 15 percent. Noranda spent about $30 million developing the property in the early 1980s before abandoning the project when cobalt prices plunged. Dale expected the deal to close by the first of the year with construction of the refinery to begin shortly thereafter. About 450 people would be employed at the mine and refinery when production peaks. Industry experts and state officials expressed skepticism about the economics of the cobalt project, and the Blackbird mine sale was still in limbo at year's end.

Idaho won a decision by the U.S. 9th Circuit Court of Appeals concerning cleanup of Blackbird Creek. The state Attorney General's office maintained that Noranda Inc. and other owners were responsible for clean-up costs for pollution caused by past mining practices at the Blackbird mine under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The appeal affirmed an earlier decision that Noranda and others were responsible even though the damage was done by previous owners. The pollution has ruined fish runs up Panther Creek. Clean up costs are estimated at $9 million.

WEST-CENTRAL IDAHO

Pegasus picked up the McKinlay Mine east of Lucille in Idaho County. They mapped and sampled it this year.

Freeport McMoran Gold Company had an exploration program for gold under way in the Logan Creek-Smith Creek area located about 3.5 miles west of Big Creek in the Payette National Forest. They 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 Inc. It is part of their 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 Company completed construction of a $3.9-million heap-leach facility at Stibnite. Mining and stockpiling commenced late this 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 100 feet high and cover approximately 11 acres. Reserves at the Yellowpine mine are about 1.1 million tons of oxide ore from which Hecla will extract about 80,000 ounces of gold over the next two years. The new plant will employ about 100 people including 30 Hecla employees and 70 contractors. A large sulfide ore reserve of 15 to 20 million tons of 0.10 ounce-per-ton gold may be mined later using a different milling technique.

Coeur d'Alene Mines Corporation continued development at Lightning Peak adjacent to the Thunder Mountain (Sunnyside) gold mine east of Stibnite in central Idaho. The mine may replace the Sunnyside which was mined out this year. Grades at Lightning Peak are comparable to the Sunnyside, averaging 0.07 to 1.0 ounce-per-ton.

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

Harlow Oberbillig reportedly did some trenching on Antimony Ridge near Yellowpine and is interested in getting someone to work on the property.

EAST-CENTRAL IDAHO

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

U.S. Antimony Corporation (USAC) and Western Gold Exploration and Mining Company (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 orebody containing 407,122 tons of 0.1 ounces-per-ton gold. The orebody is faulted off at depth and Westgold planned on drilling 15 holes to a depth of 600 feet 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 USFS for a flotation mill at Yellowjacket.

Westgold obtained a lease on the Estes Mountain mine from U.S. Antimony Corporation. 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. This year's activities included detailed mapping and sampling.

CoCa Mines acquired Geodome Resources, the parent of Sunbeam Mining Corporation, in a stock swap. Sunbeam has been in the permitting stage for a major gold mine at the old Sunbeam mine on Jordan Creek for several years and has 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 startup scheduled for this year. The problem revolved around the Pinyan Basin wetland which would be used for part of the mining operation. CoCa has noted that they 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 3.3 million tons of 0.077 ounce-per-ton gold and drilling on Grouse Creek has delineated reserves of 4.4 million tons of 0.04 ounce-per-ton gold and 1.94 ounces-per-ton silver.

SOUTH-CENTRAL IDAHO

Westgold continued to evaluate the Cu-Au skarn at Copper Basin this year. Detailed mapping and soil sampling this summer were followed by a second round of 5 to 7 reverse circulation holes. Results were not available at year's end. Westgold also had an active reconnaissance program throughout Idaho.

Sovereign Exploration Inc., a division of Total Energold, was quite active with surface geological and geophysical work all summer in the Mackay area. This fall a 10,000-foot reverse circulation drilling program was under way 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.

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

Westmont continued core drilling and detailed mapping and geochemical sampling at their 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.

Johns-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 Company drilled in Muldoon Canyon, Blaine County, reportedly looking for stratiform mineralization in the Drummond Mine Limestone.

Officials from the Sawtooth National Recreation Area (U.S. Forest Service) granted permission for Billiton Minerals Company (a subsidiary of Royal Dutch Shell) to begin a 14-hole drilling program for gold in Washington Basin. Sunshine Mining Company 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 and began work on a small placer in the Yankee Fork District. The company is headed by General Charles M. Duke, Jr., an Apollo astronaut who walked on the moon. General Duke believes that central Idaho contains potential for gold and silver based on U.S. Geological Survey reports and satellite imagery.

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 BLM for a waiver on the assessment work.

BOISE BASIN

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

The Atlanta property covers 3,100 acres and has been under exploration and development since 1985. A feasibility study by Behre-Riverside Inc. indicates that at the proposed East pit, reserves total 8.27 million tons of 0.087 ounce-per-ton gold. Operating costs for the open-pit mine would be $248 per ounce. The ore would be concentrated by flotation and then treated by bio-oxidation and cyanidation. Annual production is estimated at 101,180 ounces of gold and 258,100 ounces of silver per year for the first six years with a recovery rate of nearly 84 percent. The remainder of

the ore would be treated by heap leach. The west pit contains an additional 6.2 million tons of 0.049 ounce-per-ton gold with a recovery rate of 80.4 percent. This would extend mine life 2.5 to 4 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 $375 per ounce 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 Corp. signed an agreement with Newmont Exploration Ltd. 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 late this year in a first pass effort concentrated on one of several target areas. GEXA has been exploring the property since 1981.

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

Centennial Resources (a subsidiary of Meyer Resources) continued development drilling at their Centennial property on Blacks Creek in the Neal District east of Boise. Two rigs drilled over 150 reverse circulation holes this 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.

Rhino Resources did no work in 1989 on their 62 claims near the Giant mine in the Shaw Mountain district near Boise. Last year the lessee performed extensive geophysics, mapping, some underground rehabilitation work, and drilled 11 holes. Two of those had very encouraging results. Rhino would like to drill next year and is seeking financial assistance to evaluate the gold-rich, quartz-sulfide vein system.

Gold-Sil Mining and Milling Inc. agreed to pay $9,000 to the state to help reclaim a heap-leach operation at the Comeback mine near Pioneerville. The payment releases the company from further liability. The Comeback mine was the site of a cyanide spill in 1986 that inspired the state to adopt new rules and regulations controlling the use of cyanide for gold mining.

Westmin Resources conducted surface evaluations of several properties controlled by Cactus West in the Boise Basin. Mapping and sampling of 8,000 feet 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 Ltd. drilled about 1,500 feet of core on claims which include the Missouri Gold mine, located about 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.

Gold Post Resources terminated their lease on the old Gold Hill Mine at Quartzburg.

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 700,000 to 1 million tons of ore per year 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 12,000 feet of new road and 27 drill pads which will be reclaimed. In 1989, over 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 Co. postponed plans for gold exploration at Caribou Mountain (9,800 ft elevation) located east of Grays Lake in southeastern Idaho. The weather (lots of snow) and budgetary decisions were responsible for the postponement.

Freeport had planned on upgrading the Barnes Creek road, constructing about 21,000 feet 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 9,200 feet and an extension of the Monte Cristo mine road, south past the Evergreen mine, would be at 8,200 feet. 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. They mapped and did some geochemical sampling this year and plan a drilling program for next year. 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 their perlite mine but may do more next year.

Westgold continued exploration at its Oakley-Project on the west side of Middle Mountain in Cassia County. Eleven reverse circulation holes totaling 2,300 feet were drilled on this structurally complex hot spring gold prospect hosted in Tertiary basin-fill elastics 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. Atlas is developing the Grassy Mountain gold property in Malheur County, Oregon, (estimated 1.2 million ounces of gold) and maintains an exploration office in Boise.

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 elastic sediments interbedded with Middle to Late Tertiary volcanics.

Nerco Minerals continued developing the new Stone-Cabin mine on a 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 200,000 feet of drilling were 435,000 ounces of gold and 8.9 million ounces of silver. High-grade ore will be milled at the Delamar mine, five miles to the west, and low-grade ore will be leached on a 170-acre site half-way 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 over $8 per share. Nerco plans on drilling about 15 holes this year. The first two of these holes intersected mineralization.

North American Silver Corporation 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 have formed a partnership to develop the Blue Dog gold property near Weiser in Washington County. The partnership has formed a joint venture with Homestake Mining which controls the property. Previous drilling outlined 5.8 million tons of 0.025 ounce-per-ton gold. A high-grade core zone contains 532,000 tons of 0.092 ounce-per-ton gold. Three diamond drill holes totaling about 750 feet were completed this fall to test the high-grade core and extensions of the lower grade material. Results were encouraging. One hole had a 160-foot section that averaged 0.071 ounces-per-ton gold with a 15-foot intercept of 0.258 ounces-per-ton 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 Johns-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.

OTHER MINING NEWS

The Idaho Land Board prohibited all mining along a section of the Boise River from Lucky Peak Dam to Star. The action drew little attention as there has never been any active mines in the area.

Clayton Silver Mines lost a bid for property tax relief from Custer County officials. Management asked for a hardship exemption from property taxes for 1986 and 1987. The mine, which celebrated 50 years of operation in 1985, was closed in 1986 due to poor silver prices.

Governor Andrus surprised miners when he suggested keeping all heavy truck traffic off the Johnson Creek road in Valley County. Johnson Creek was the site of a diesel spill in September that resulted in a fish kill. The announcement shocked several companies, including Coeur d'Alene Mines Corporation, Hecla Mining Company, and Pioneer Metals, that have active mining operations in the area and rely on the road for transporting men and materials. The companies suggested improving the road rather than restricting use. The road is under heavy use while $8 million in improvements are being made on the South Fork of the Salmon River road to mitigate severe erosion problems.

The College of Southern Idaho conducted a seminar on gold panning this May. Twenty would-be millionaires participated. Instructor for the course was Larry Dee, geologist with the Bureau of Land Management at Shoshone.

Five mines and exploration projects in Idaho were honored by the state Land Board for their excellent operating records and reclamation efforts. Honored were the Cherry Creek project (Freeport near Malad), the Thunder Mountain mine at Thunder Mountain (Coeur d'Alene Mines Corp. and Thunder Mountain Gold Inc.), reclamation at the Henry mine (Monsanto Company), Asarco for reclamation at the Galena and Coeur mines tailings impoundments, A and T Mining for maintaining water quality at a large placer on the main Salmon River near Lucille, and George Castle for reclamation of a small placer mine on Stanley Creek.

New surface mining regulations were approved by the Idaho Land Board in mid-year. The new regulations will be administered by the Bureau of Minerals in the Department of Lands. The regs were originally formulated by the department, and differences in opinion were worked out in consultation with the Idaho Mining Association and the Idaho Conservation League.

House Bill 295, a stream antidegradation bill, became law in March. This bill boosts the state's ability to monitor and protect water quality. An additional facet allows public input in the event of a major threat to high-quality waters. The bill was originally supported by the Idaho Mining Association (IMA) and environmental groups. Late in the game, north Idaho miners took exception to parts of the legislation in opposition to other IMA members from southeast Idaho and elsewhere in the state. Despite their objections, the bill passed.

Jack Peterson, president of the Idaho Mining Association, announced he was leaving for a job at the Idaho Engineering Laboratory. During his 10-year tenure with the IMA, Jack made great strides in bridging differences between conservation groups, the mining industry, and agencies in state government. He was an eloquent spokesman for IMA and served the industry well, both in the state legislature and in Washington, D.C. Jack's column in the Idaho Statesman was particularly effective in promoting the industry and informing the public of the importance of mining to the Gem state. Mr. Jack Lyman was hired as the new director of IMA in mid-year.

The Idaho Wilderness Bill was alive in Washington, D.C. during the year. The compromise bill, drafted last year by Senator James A. McClure and Governor Cecil D. Andrus, calls for creation of about 1.4 million acres of new wilderness in Idaho and an additional 764,000 acres of controversial special management zones. Another bill sponsored by Rep. Peter Kostmayer of Pennsylvania, called for 3.9 million acres of additional wilderness in Idaho. The McClure-Andrus bill was approved by the Senate Energy and Natural Resources Committee, but by then it was too late in the session for consideration by the full Senate. If passed, the bill will have tough sledding in the House. The Kostmayer bill was given little chance of passage by either body.

Changes to the 1872 Mining Law continued to be a major issue in 1989. Senator Dale Bumpers (Arkansas) introduced a bill that included changing the patenting provision of the 117-year-old law and levying a royalty on all minerals extracted from federal lands. Environmental groups praised the bill and industry groups damned it. Bumper's bill was not considered by the senate during this session but will probably return next year.

A plan to develop the old Bayhorse townsite as a state Centennial park was thwarted when the town's owner, Umont Mining, wanted too much money for the property. The company believed the 54-acre tract was worth $400,000; the state appraised the site at $55,000. The ghost town of

Bayhorse served the mines in the area during the 1800s. The town is noted for the remains of several charcoal kilns that were used to make charcoal, a material used to process ore from the local mines. The Centennial park may be built at an alternate site near Custer, another early mining town on the Yankee Fork of the Salmon River.

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