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## **INTRODUCTION**

This report on Idaho's mineral industry and energy resources for 1986 is a cooperative effort among several state and federal agencies and mining companies active in the state. The Idaho Geological Survey acknowledges the contribution of the Idaho Bureau of Minerals, the U. S. Bureau of Mines, the federal Mine Safety and Health Administration, the Idaho Oil and Gas Conservation Commission, and the Idaho Mining Association. Numerous individuals in industry, the U.S. Forest Service, and the U.S. Bureau of Land Management have also contributed information. Previous annual reports since 1977 are available from the Idaho Geological Survey. A map showing selected cities and towns in Idaho is shown in Figure 1 for geographic reference.

This report has been compiled by Earl H. Bennett, Idaho Geological Survey, University of Idaho, Moscow, ID 83843 and is not to be distributed without permission of the Idaho Geological Survey. For more information, please call the Survey office, (208) 885-7991.

### **International Economics Affecting the Mining Industry**

The importance of oil and the value of the U.S. dollar to the world's economy was the major economic story in 1986. In December of last year, the Organization of Petroleum Exporting Countries (OPEC) announced that all attempts to limit oil production by member nations were abandoned, exacerbating the world oil glut and falling petroleum prices. The cartel remained unable to reach production limit agreements for the first part of 1986 and the price of oil plunged from \$31 a barrel last November to below \$10 a barrel in April. Increasing oil stocks around the world helped the price fall.

The U.S. dollar, forced down in value by agreement of finance ministers from the free world's top five nations last year, continued to slide, ending the year at its lowest value against the yen and the mark in several years. This is a substantial change from 1985 when the dollar hit record highs against these currencies.

The federal deficit of \$220.7 billion in 1986 and the country's huge trade deficit of over \$200 billion for the year continue to be serious problems for the world's economy as well as our own. The U.S. has had deficits for 25 of the past 26 years. Paul Volcker, chairman of the Federal Reserve, warned that our economy is being financed by a heavy flow of foreign capital into the U.S.

The lower value of the dollar against the Japanese yen and German mark did little to reduce the country's trade imbalance. Growing concern about the trade deficit found many Congressmen looking at possible trade sanctions and other protectionist measures against some of our trading partners, notably Japan, if that country did not remove trade barriers, open its markets, and reduce its massive trade surplus.

Figure 1

The stock market turned in a wild performance for the year, making and then breaking records for both gains and losses in the DOW Jones Industrial Average and setting new trading records. In July, the DOW had its sharpest decline in history, dropping 62 points from near record highs to 1,839 in one session. Worries about the economy fueled the drop. Besides economic news, the advances and declines were driven by computer trading where computers programmed to sell or buy stocks play off the price of stocks against the stock index futures. A shift in stock prices or the futures index can trigger massive selling or buying, resulting in the observed huge swings in the DOW.

The market collapsed again in September, falling a new record of 86.6 points in one session to 1,792 on worries of rising interest rates and fears of renewed high inflation. The market rallied on December 3, the fourth busiest day on the Big Board, pushing the DOW to a record 1,955. A trading record of 245 million shares was set on December 19.

As noted, the year was characterized by dramatic advances and declines in the DOW Jones Industrial Index. Five declines in January (39 points), April (41 points), June (45 points), July (61 points) and September (86 points; as noted, the largest single decline in history) exceeded losses at the beginning of the 1929 stock market crash.

Wall Street was shaken in November by the Ivan Boesky insider trading scandal. Boesky was fined \$100 million by the Securities Exchange Commission for using inside information to make millions on stock trading. This was the largest fine ever levied by the SEC. The Boesky affair was just the beginning of major allegations concerning illegal trading practices on Wall Street that was continuing at year's end. The Boesky scandal caused a 43-point drop in the Dow Jones Index in November.

### **International Mineral Economics**

Overall, the mining industry remained in the doldrums. A few bright spots included precious metals and the U.S. copper industry that continued to reorganize. A few copper producers like Phelps Dodge turned a profit for the year. The Federal Reserve Board noted in October that the operating rate of the U.S. mining industry fell to 72.5 percent of capacity, the lowest since record keeping began in 1967.

Gold prices started the year with an 18-month record high in January of \$380 an ounce but the price fell back to the \$345 range where it remained until August. Platinum started the year in the \$360 an ounce range. Even the bombing of Libya by U.S. forces in May caused little reaction in gold and silver.

In February, a major turn around in platinum and gold began. Unfortunately for Idaho, silver did not follow its rich cousins. Platinum started the show in February going over \$400 an ounce as investors recognized that the metal has a strong industrial demand as it is used catalytic converters in automobiles, among other uses. A strike at Impala Platinum Holdings Mines' four mines in South Africa disrupted production as the company fired two-thirds of its work force. Fears of

major upheavals in the country that supplies over half of the free world's gold and 80 percent, or two million ounces, of its platinum drove the price of platinum higher in June. Precious metal users and investors were concerned that South Africa would curtail production of metals in retaliation for threats and sanctions from western countries protesting apartheid. These fears proved groundless. The dollar was now hitting new lows against foreign currencies. There was little improvement in the U.S. trade deficit that was supposed to be helped by the lower value of the dollar against the mark and yen. Gold had its sharpest advance in 18 months in August. The same month platinum, prices rose 15 percent in one week and ended the month with a 30 percent gain for an overall increase of 70 percent over the past 12 months. Platinum continued to soar at the end of August in spite of an announcement by the South African Geological Survey that new discoveries had doubled the countries known reserves. By early September, the metal had reached \$676 an ounce. By the end of September, the wild ride was over and platinum began a retreat. Platinum soared again in October, to \$580, this time driven by a walkout of 250-300,000 black miners at gold mines in South Africa in observance of 177 men killed at the Kinross Gold mine disaster in September. This was the largest work stoppage in the country's history. Gold gained little due to the strike. Platinum had fallen back to the \$485 area by year's end and gold finished the year at \$390 per ounce.

A bizarre plan was proposed by eastern congressmen to sell gold from the U.S. stockpile to drive down world prices and prevent South Africa from obtaining revenue from gold sales. This was considered as a possible sanction against the country. South Africa receives about 75 percent of its foreign exchange earnings from precious metals. Fortunately, the ill-conceived plan was defeated in the Senate.

The U.S. Government released the first gold coins minted in this country in over 50 years in October. The American Eagle coins in one ounce (\$50), half ounce (\$25), quarter ounce (\$10), and tenth ounce (\$5) denominations were a big hit by year's end. Sales of the coin had to be postponed by the U.S. Treasury in October because the mint could not keep up with the tremendous public demand. The first batch of 800,000 coins was sold out in two days.

The thirst for gold in Japan continued at a frenzied rate with awesome demand for the Hirohito coin commemorating the 60th year of the Emperor's reign. The entire 10 million coin issue representing some 6.4 million ounces of gold was sold out long before the coin was released. A silver Hirohito commemorative was also very popular.

The Commodity Exchange in New York (COMEX) reached an agreement with the Sydney Futures Exchange in Australia forming another link in a chain to allow world-wide, around the clock futures trading in gold. The Chicago Mercantile Exchange reached a similar agreement with the Singapore International Monetary Exchange in 1984.

Silver failed to participate in the dramatic price increases for gold and platinum. The metal started the year with a price of a little over \$6.00 per ounce. A low of \$4.83 an ounce was reached in May. A brief rally in September pushed the price over \$6.00 but it quickly fell back, finishing

the year at \$5.30. Major uses of silver continue to be photography, followed by electronics. More silver is being used for coinage due to the public's recent interest in silver coins.

Falling silver prices sparked calls for protectionist measures from some north Idaho mining men. Cecil Andrus, in a successful attempt to regain the state's Governorship, championed tariff protection. The Idaho congressional delegation looked at the possibility of some sort of tariff against Mexico and Peru, the world's largest producers, but, at the suggestion of other Idaho miners, dropped the idea, realizing that silver prices are controlled by world-wide markets. Peru and Mexico could sell their silver to other countries and the metal could then be exported to the United States without a tariff. Other ideas to help the silver industry included federal price supports for the metal, using silver from Mexico and Peru to pay back their foreign loans or as collateral for their huge foreign debts, and asking for voluntary production cutbacks from Mexico and Peru. Silver prices began to edge up in August but exchange stockpiles reached a record 158.6 million ounces by the end of the month. A positive note for silver was the overwhelming acceptance of the U.S. Silver Eagle coins that went on sale in November. Over 5-million were minted by year's end. The one-dollar coin contains one ounce of silver.

In August, Representative Larry Craig announced that some congressmen were attempting to reduce the National Defence silver stockpile by selling 14 million ounces of the metal. The release of this amount of silver would have had a negative effect on the already low price of the metal. Craig was able to alter the bill so that it called for selling only 5 million ounces of silver and putting 3 million ounces into coinage. Idaho's Senators McClure and Symms managed to later eliminate all sales from the stockpile, channeling the 3 million ounces into coinage for the new Liberty dollars authorized by congress last year.

Switzerland announced plans in August to sell 267 tons of silver held in its vaults since the silver crash in 1980. The country plans to sell the hoard in small amounts so that world prices will not be disrupted.

In a small way, the Silver Valley entered the silver manufacturing business. The Silver Valley Economic Development Committee supported the opening of an outlet for Coeur d'Alene silver and in June the Idaho Silver Shop opened its doors. The shop sells a variety of finished silver goods using metal from the district's mines.

The collapse of the tin cartel last year had a negative, short-term affect on other metals as well. In September, Malaysia admitted that it had backed an attempt to corner the world's tin market in 1981 and 1982. The attempt failed and resulted in a huge surplus of tin that eventually led to the demise of the International Tin Council's ability to control the market, resulting in the collapse of the cartel.

Cobalt prices started the year in the \$11 range and fell precipitously to the \$3.60 mark as Zaire and Zambia each tried to gain a larger market share by cutting prices. By September, the two countries had apparently decided to join forces rather than fight and the price rapidly rose from

**\$3.60 to \$7.00.** The two countries control about two-thirds of the non-communist world's cobalt. The cobalt market has been volatile in the past, with prices going as high as \$50 per pound in 1978 due to political unrest in Zaire and doubling from \$6 to \$12 per pound in 1984 based on the report that Zaire did not have any steel drums available to ship the metal. Cobalt is of interest to Idaho as the Blackbird mine, located 30 miles west of Salmon, is the nation's most readily available source of the metal. The mine is controlled by Noranda Inc. The company invested \$30 million in the property in the early 1980's before shutting down due to low cobalt prices.

Molybdenum, important to Idaho's Thompson Creek mine owned by Cyprus Minerals (see Other Mining Operations in the State), started the year at a dismal \$2.50 a pound. Both Cyprus and Amax announced Producer Prices of \$3.20 and \$3.45 respectively in mid-year, and the metal closed the year in this range. Cyprus is emerging as a major force in Moly, having purchased Duval's Sierrita copper/molybdenum mine in Arizona this year. The market was helped by the closure of the Questa Molybdenum mine in New Mexico by Molycorp in February and a reduction in production by AMAX at both the Climax and Henderson mines in Colorado in September. According to the E and MJ (March, 1987), China is emerging as a major source of molybdenum, producing about five percent of the world's supply.

LTV Corporation, the United States second largest steel company, declared Chapter 11. This is the largest industrial firm ever to seek protection under the federal bankruptcy laws. The company had over \$4 billion in liabilities related to losses in energy and in steel. Among the casualties of the default were substantial coal contracts with Cyprus Minerals Company.

Lead prices increased during the year from 19 cents in January to 24 cents in December. According to the March issue of the Engineering and Mining Journal, the closure of the Lucky Friday mine in Idaho and the Buick mine in Missouri reduced U.S. lead production by 18 percent.

Most zinc producers suffered a loss for the year. The metal started the year depressed at 34 cents a pound, rose to 46 cents in October, and finished the year at 43 cents. Towards the end of 1986, Teck, MIM Holdings, and Metallgesellschaft purchased 31 percent of Cominco Ltd. from Canadian Pacific Ltd. Teck has 51 percent of the shares. According to the March E and MJ, the companies now control about 20 percent of the western world's zinc output.

Major changes continued to affect the U.S. copper industry. Penzoil sold the Sierrita mine in Arizona to Cyprus. Phelps Dodge became the largest domestic copper producer when Kennecott sold the Ray mine and Hayden smelter to Asarco. Kennecott, although reducing copper mining activity, is completing a \$400 million expansion and modernization program at Bingham. Asarco also purchased Cyprus' Pima mine and Anamax's Eisenhower mine adjacent to its Mission mine in Arizona. Butte was placed back in production by Montana Resources. Newmont spun off Magma Copper as a separate company with the San Manuel and Pinto Valley mines. Copper inventories were reduced during the year, which is good for the industry. Figure \_\_\_ is taken from the March issue of Engineering and Mining Journal and shows the ownership of the major copper mines in the United States.

## **Idaho Mineral Economics**

The value of non-fuel production in Idaho in 1986 according to the U.S. Bureau of Mines (Table 1) was \$246,716,000 compared to \$358,660,000 last year. The difference was due to losses in the values of silver (\$115,645,000 to \$61,301,000) and phosphate (\$104 million to \$80 million). Both silver and phosphate production also decreased as mines closed due to low commodity prices. Idaho ranked 32 in the nation in the value of non-fuel production. Figure 2 shows the value of non-fuel production in Idaho from 1967 to 1986 and the value in constant 1967 dollars. There were an estimated 2,900 workers employed in the state's mining industry in 1986, down 26% from last year. Wages for mineral industry workers remained the highest of any industrial sector in Idaho.

Table 1  
Figure 2

## **ACTIVE MINES AND PROCESSING PLANTS (Figures 3 and 4)**

### **Coeur d'Alene Mining District**

#### **Introduction**

Employment declined drastically in 1986 in the Coeur d'Alene district, which was already an economically depressed area. The Crescent mine (96 men), Sunshine mine (400 men), Lucky Friday mine (245 men), and Consolidated Silver project (32 men) closed due to poor metal market conditions. The sum total of these closures was the loss of 773 jobs in the district this year. Hopefully, many of these are only lost temporarily. Only the Galena mine (265 men) and Coeur mine (157 men) operated by Asarco continued mining. Peak employment in the Silver Valley was in 1957, when there were 3,500 miners and 1,400 smelter and refinery workers. This fell to about 2,600 in the 1960's and 1970's as base-metal mines closed. With the closure of the Bunker Hill Complex in 1981, the 1,400 smelter and refinery positions were lost and mining jobs fell to about 1,600. The closure of the Star-Morning mine in 1982 cost another 300 jobs and when Hecla, Sunshine, and Coeur d'Alene Mines moved their corporate headquarters out of the Valley last year, another 100 positions went with them.

The impact of lost mining jobs has had a dramatic effect on other employment as well, and total number of jobs in the district fell from 8,250 in 1981 to 4,818 in February of 1986, with the decline expected to continue. Unemployment is officially at 22 percent, with the actual number estimated as high as 43 percent. Kellogg has lost 27 businesses since Bunker Hill closed.

The red ink related to the closing of the district's mines is indicated in Table 2, showing net production and other statistics from the Shoshone County Assessor's office. The loss of tax revenues has been a serious strain on county and local government, and all civil services including

the area schools have suffered. Many people have left the Silver Valley due to the depressed economy and this of course, only exacerbates the loss of tax income. Enrollment in the Kellogg school district dropped from 3,000 students in the 1970's to 1,900 in October. The loss of students at both Wallace and Kellogg may force school closures and consolidation of districts in the near future.

To address the problem of poor silver and other metal markets, the Senate Energy Subcommittee on Natural Resources, Development and Production met in Coeur d'Alene in August. The hearings were chaired by Senator John Warner of Virginia. Idaho's Senators James McClure and Steven Symms, as well as Representative Larry Craig, were present. Representatives from all of the major Coeur d'Alene companies testified

Table 2

Figure 3

Figure 4

and offered suggestions for helping silver miners in north Idaho. Some north Idaho mining men called on the federal government for help, either with a subsidy on silver in the form of production loans to be repaid when silver prices improved or import protection through some sort of tariff. Others claimed none of these ideas would help in the long run as they have been tried in the past and have failed or exacerbated an already difficult market situation.

In spite of mine closures, the district still managed to produce 9,400,000 ounces of silver, good enough to keep its number one ranking for silver production in the United States. This was, however, a substantial decrease from the 16,679,000 ounces produced last year. In addition to silver, the district produced 10,890 tons of lead, 2,716 tons of copper, 1,245 tons of zinc, and 1,457 ounces of gold. Total value of the metals was \$61,266,000, compared to \$128,086,000 last year. Silver production from the Coeur d'Alene since 1884 has been 1,024,323,000 ounces of silver; that, combined with the other metals, has a historic dollar value of \$4,798,186,000. These production figures were supplied by Don Springer, Osburn, and the Coeur d'Alene Mining District Museum at Wallace, Idaho.

The magnitude of the federal deficit that is a major problem for the U.S. economy is illustrated by the following comparison. The federal deficit for FY-86 (October through September) was \$220.7 billion. This brought the national debt to a total of \$2.2 trillion. Servicing this debt cost the government \$187.1 billion, or \$15.6 billion per month in FY-86. The net historic dollar value of all the metals mined in the Coeur d'Alene district over the past 103 years is \$4.8 billion. The entire amount would only pay the interest on the national debt for nine days.

### **Asarco Inc.**

Asarco Inc. is one of the largest mining companies in the world. Included in its international empire are the Coeur and Galena mines in the Coeur d'Alene district. The company has a well-known reputation for efficiency and productivity. If there was ever any doubt about these claims, witness Asarco's recent record in the district. Over a 15-year period, 1971 through 1985, the

Galena mine produced 57,146,376 ounces of silver, more silver than any other mine in the Coeur d'Alene. During this same period, the Sunshine mine yielded 53,083,729 ounces and the Lucky Friday mine, 47,024,219 ounces.

Production from the Galena mine (owned by Callahan Mining Company and operated by Asarco under a 30-year lease which is renewable for another 30 years) fell a little behind last year. The mine produced 3,988,176 ounces of silver from 200,819 tons of ore in 1986 versus 4,103,524 ounces from 200,176 tons last year. Average grade was 20.5 ounces per ton. A new pumping system was installed in the mine. The Galena and No. 3 shafts were connected on the 5200 level and development work concentrated on the 164 vein on that level. On an average for the year, there were 223 men working in the Galena and 13 in the 750 ton-per-day mill.

The Coeur mine (owned by Coeur d'Alene Mines Corporation and operated by Asarco on a 50-year lease), set a new production record of 2,743,121 ounces of silver from 155,610 tons of ore compared, to 2,628,265 ounces from 151,224 tons in 1985. The Coeur shaft was rehabilitated to the 3700 level and development work concentrated on the 356 and 483 veins. The mine employs 132 men and 10 more work in the 450 ton-per-day mill.

By May, Asarco crews were within 360 feet of the Wire Silver vein, the target of the American Silver venture, when work was suspended due to poor metal prices. The drive from the 3400 level of the Coeur mine has advanced over 5,128 feet since it began in 1979. The project has had several curtailments due to low silver prices but Asarco keeps plugging away at the program. The drift advanced 544 feet in 1985 and an additional 171 feet this year.

### **Bunker Limited Partnership**

Early in January, Bunker Ltd. Partnership split its work force at the Crescent mine into two, 30-man crews, a Blue team and a Red team. The teams would work alternating two-week shifts; unemployment would cover the off-weeks. In this way, the company hoped to maintain its trained work force in the face of declining silver prices. The employees would also continue to receive medical and dental benefits. The team approach worked until May, when the company was forced to close the mine indefinitely due to the depressed silver market. The mill operated through June at a capacity of 150 ton-per-day, after which it was placed on standby. There were 11,367 tons of ore mined from the Crescent, yielding 170,000 ounces of silver prior to the shutdown.

The Department of Labor denied the miner's request in November for benefits under the Trade Readjustment Act because the concentrates from the Crescent mine were processed overseas. Therefore, the men were not eligible for the benefits that were available to lessen the impact of foreign imports on domestic jobs.

The company received bad news in January, when the Idaho Supreme Court reversed a lower court ruling and ordered that the Partnership must pay the state \$228,227 in back taxes for materials purchased for the two big smoke stacks at the Smelter and Zinc Plant. The company filed for a

rehearing and claims that the equipment and materials qualified as production exemptions and were therefore not taxable under the Idaho Use Tax.

In June, Bunker Ltd. split its operations into two wholly owned subsidiaries, Crescent Silver Mines Inc. (which the company hopes to take public some day) and Syringa Minerals Corp. (which will own the Bunker Hill mine, smelter, zinc plant and other surface facilities). The cost of maintaining the Partnership's idled properties is estimated at \$72,000 per month.

In October, fire gutted an abandoned warehouse at the smelter. There was concern about the toxicity of the smoke, as heavy-metal dust and other hazardous materials were stored in the abandoned buildings. The warehouse contained no hazardous substances but health officials were worried that the fire might spread to other buildings. The warehouse was a total loss but there were no injuries.

### **Callahan Mining Corporation**

At the Caladay project, the company planned to do 22,892 feet of diamond drilling, bringing to a close the first phase of the \$26.6 million project that included the sinking of the 5,100-foot-deep Caladay shaft. All drifting was suspended in February due to depressed metal prices. A 1,699 foot drift on the 4900 level was completed before the suspension; it may eventually connect to the Galena mine workings. In October, 1985, mineralization was discovered in this drift but was not economic. Underground diamond drilling continued all year with two drills operating one shift per day. Work concentrated on extending existing holes north of the shaft.

The company turned a profit in the third quarter with revenue from the new Ropes Gold Mine in Michigan leading the way. Start up problems were overcome in mid-year and the mine produced 45,781 ounces of gold by year's end. Income was up over last year from the company's 50% share in cash flow from the Galena mine and 5 percent share in profits from the Coeur mine (both operated by Asarco), although metal prices and therefore profits were lower than last year.

Livengood Placers Inc. (80 percent owned by Callahan) regained control of its placer property in Alaska from the bankruptcy trustee for Galaxy Minerals Inc., the former lessee of the property. The company regained control after Alaska Placer Development cleaned up gold-bearing gravels left by Galaxy's operation.

Callahan earned income from its wholly owned subsidiary, the Flexaust Company, a producer of industrial hose and tubing. The company also has interests in several Canadian oil ventures (under Panarctic Oil Ltd.) with its subsidiary, Pinnacle Exploration Inc.

### **Coeur d'Alene Mines Corporation**

Coeur d'Alene Mines Corporation had a banner year in 1986, moving from a passive holding company (owner of the Coeur mine, which is operated by Asarco) to a full-fledged mine operator.

The company started a new gold mine in central Idaho and the largest heap-leach silver mine in the world in Nevada. In spite of this progress, low metal prices forced a \$4.7 million loss for the year, but this included a \$3 million write-off of the company's 17.1 percent interest in the Consolidated Silver project and a \$610,000 write-down of interests in an Oklahoma oil and gas venture.

In December 1985, Coeur d'Alene Mines Corporation announced it would develop the Rochester Silver mine located near Lovelock, Nevada. Ten months later, in October, 1986, the new \$22 million facility was dedicated, quite a feat considering that Rochester is the largest heap-leach silver mine in the world. Coeur acquired a lease on the property from Asarco in 1983. The mine is owned by Royal Apex Silver Inc. Coeur is the major stockholder in Royal Apex, owning 48.3 percent of the company's stock. When in full production, the mine will yield an estimated 3.8 million ounces of silver and up to 43,000 ounces of gold per year. The ore is low grade, averaging 1.55 ounces of silver and 0.011 ounce of gold per ton. Production is planned at 15,000 tons of ore per day. The mining contractor is the Morrison-Knudsen Company. The ore will be leached on a huge pad that is currently over 4 million square feet in size and will ultimately measure 10 million square feet. Crushed ore will be stacked in continuous lifts on the pads to a maximum height of about 200 feet. The recovery mill uses the Merrill-Crowe process, but on a very large scale. Ore reserves are 102 million tons, with the initial pit having a capacity of 63 million tons of minable ore. Exploration is still underway to expand reserves. The mine has a projected life of 13 years and will employ about 150 people, mostly from the Lovelock area. By the end of the year, 544,000 ounces of silver and 4,200 ounces of gold had been recovered.

The financing of this project is most interesting. Morrison-Knudsen Company has the mining contract and therefore picks up the capital expenditures for equipment, etc. Coeur has a clear title to the mine and, in October, sold the processing plant to Manufacturers Hanover Commercial Corporation for \$16.2 million and then leased the facility back on a 10-year lease. Total investment for the project was about \$40 million, raised by a sale of \$25 million in convertible subordinated debentures in August 1985. A public offering of 1.1 million shares of common stock in December raised \$17.8 million. It appears that Coeur has a minimal cash investment in the new mine and has left the mining headaches to Morrison-Knudsen.

On September 26, Coeur dedicated the new Thunder Mountain heap-leach gold mine in central Idaho. The mine will produce about 27,000 ounces of gold per year during the five-year life of the project (see Other Mining Operations in the State).

Royal Apex Silver acquired Galli Exploration, with 11 properties in Nevada, Arizona, Idaho, and Washington. One of these is a claim block in Wide West Gulch just south of Rocky Bar in Elmore County. Galli drilled these claims this Fall and is now evaluating assay returns. Peter Galli, the owner of Galli Exploration, was instrumental in finding several major gold mines in Nevada, including the Pinson, Preble, and Sterling mines.

Coeur Exploration did some drilling on the Harlow property located about two miles north of Osburn. The 90-claim block is owned by Royal Apex Silver, which acquired the claims in 1965. Coeur has been exploring the Harlow ground since leasing the property in 1980. The company spent \$117,563 on the property last year.

### **Hecla Mining Company**

Hecla Mining Company finished the year with a \$21.2 million loss. The company's industrial rock and mineral holdings, including Kentucky-Tennessee Clay and Colorado Aggregate Company, were bright spots, as was the Republic Unit (Knob Hill gold mine) in Washington.

The company wrote off \$8.5 million in 1986, including the Revenue Virginius mine near Ouray, Colorado (\$5.5 million; the property was inherited from Rancher's Exploration, acquired in 1984); the closing out of Rancher's Gold and Silver Exploration program; and the planned sale of Hecla's interests in the Leadville mine in Leadville, Colorado, and the Tungsten Queen mine in North Carolina.

The company dedicated its new \$6 million office complex at the annual shareholders's meeting on May 9. The 70,000 square foot structure was designed by the Spokane architectural firm of Adkison, Leigh, Sims and Cuppage and built by the Bouton Construction Company. The building is located on 13 of the 127 acres owned by Hecla just north of Coeur d'Alene on Highway 95. About 80 employees work in the new facility that will bring a \$2.5 million payroll to Coeur d'Alene.

At Hecla's shareholder's meeting, Arthur Brown was named President and Chief Operations Officer; William Griffith remains Chairman and Chief Executive Officer. Elmer L. Bierly and Roger A. Kauffman were promoted to vice presidencies. A shareholder's rights plan was approved as "shark repellent" to thwart hostile takeovers.

Production was interrupted at the Lucky Friday mine, flagship of the company, in March by a series of rockbursts and a miner was killed by a burst later in the month. Rockbursts are a big problem in all of the mines in the district that are over a mile deep.

All production at the Friday was suspended for an indefinite period on April 11 (dubbed Unlucky Friday by the press) due to low silver prices. The mine was still closed at year's end. The company needs a silver price of at least \$6 per ounce to operate. About 240 men were laid off by the closure. These employees are eligible for Trade Readjustment Act benefits.

Before closing, the Friday yielded 1,324,182 ounces of silver from 82,041 tons of ore. Hecla also received income from its 12 1/2 percent interest in the Galena mine and 5 percent interest in the Coeur mine.

To reduce costs, the company cut wages for 120 workers at the Escalante silver mine in Utah by 10 percent in April but the mine continued to operate throughout the year. Hecla's additional 280 salaried workers also took a 10 percent pay cut and top executive pay was trimmed by 15 percent.

Although production stopped at the Lucky Friday mine, there was still some important research being done underground. Hecla is experimenting with a new mining method called Underhand Long Wall Stopping (Figure \_\_). The conventional mining method in the district is Overhand Cut and Fill Stopping (Figure\_\_). In cut and fill, stopes are raised upwards from haulage levels. Mining leaves a "crown pillar" as the top of the stope is approached. At the great depths of the Coeur d'Alene mines there is a tremendous stress buildup in the crown pillar that can result in rockbursts. In the new technique the vein is mined downwards. In the Friday, four stopes several hundred feet apart on the 5100 level are sunk on the vein. Ramps lead from the stopes to ore passes located several hundred feet away from the vein. There is an ore pass for each stope and these feed to a haulage level where the ore is transported to the Silver Shaft.

The mined-out stopes are backfilled with a very thick concrete mixture that has the consistency of tooth paste. It requires three to five days to set up, after which time another level can be developed below the filled stope. The concrete is prepared at the surface and pumped 5,100 feet down the Silver Shaft and then 2,000 feet to the stopes via six- and eight-inch pipelines. Controlling this material is a problem and is the part of the process being developed by Hecla. Hecla is trying the new mining method from the 5100 to the 5300 level and hopes to use the technique for all subsequent deep development and mining. This type of mining is used successfully in the deep gold mines in South Africa. The main benefits are the reduction of rockbursts at these great mining depths and an increase in productivity by 30 to 40 percent. This hopefully will reduce the mining cost per ounce of silver to \$6.00 or better.

Another new technique being tested at the Friday is the use of Foam Concrete Raise Preparation in place of timbered raises. Both the longwall mining method and the alternate raise design are being developed in cooperation with the College of Mines and Earth Resources at the University of Idaho and the U.S. Bureau of Mines.

All work was also suspended at the Consolidated Silver Project near Osburn on Unlucky Friday. In August, all exploratory work ended due to disappointing results. The program had concentrated on easterly drifting and drilling on the 5400 level of the Silver Summit mine, looking for mineralization along the Silver Summit No. 4 vein. The downward extension of this vein was found in 1984 and looked promising at the time. Although some ore was found, it was not in commercial amounts. Hecla has an 86 percent interest in the venture and the rest is owned by Coeur d'Alene Mines Corporation. About \$17.5 million was spent on the project. Coeur d'Alene Mines wrote off its investment in ConSil late in the year.

Shortly after the closure of the Friday, Hecla announced it would sink a new shaft at the Knob Hill mine (Republic Unit) near Republic, Washington, to mine a new orebody, called the Golden Promise vein, discovered last year. The \$2.2 million shaft, 1,300 feet deep and six feet in diameter,

was completed in November. There are 300,000 tons of reserves in the Golden Promise vein, averaging 0.8 ounces of gold per ton at a mining cost of \$160 per ounce. This is five year's production for the mine that now is a primary money maker for the company.

Hecla stopped all work at the Allied Silver project in April. The company was exploring the Allied claims adjacent to the Lucky Friday mine from the 5100 level of the mine. The Web Leasure vein was the target of the program.

Striking out in a new direction, Hecla Mining Company of Canada (a wholly owned subsidiary) signed an agreement in July with Highwood Resources Ltd. of Calgary, Alberta, Canada, to develop the Thor Lake, Northwest Territories, special metals deposit. Hecla will do a feasibility and marketing study and, if favorable, will develop the mine and production facilities at an estimated cost of \$30 million. Production could start by 1988. The deposit is located about 100 kilometers southeast of Yellowknife at the northern end of the Great Slave Lake in the Northwest Territories. The orebody contains 1.8 million tons of 0.76 percent beryllium oxide reserves, including 507,000 tons of 1.1 percent beryllium oxide. The orebody also contains 0.17 percent yttrium oxide and 0.58 percent niobium oxide. High-grade zones of niobium and rare earths are being evaluated. The primary beryllium mineral is phenakite, the beryllium oxide, and this is the only deposit of its kind in the world. The ore can be treated by conventional flotation technology. Concentrates will be shipped from the mine site to a refinery. Hecla's major competition in the space metals game is Brush Wellman Inc., which has a corner on the beryllium market.

Newhawk Gold Mines Corporation and Lacana Mining (a joint-venture called Newcana) reported encouraging results from the Sulphurets property located 60 miles north of Stewart, British Columbia, Canada. The property is owned by Granduc Mines Ltd., and Hecla is the major stockholder in Granduc. The discovery at the property was made by ESSO Minerals under an earlier agreement with Granduc. Hecla's interest in Granduc goes back to 1964.

The Kentucky-Tennessee Clay Company is the largest producer of ball clay in the country. The company operates 17 open-pit mines in Kentucky, Tennessee, and Mississippi. Since acquiring Kentucky-Tennessee from Ranchers, the company has provided substantial returns for Hecla.

Another industrial mineral company owned by Hecla is the Colorado Aggregate Company, which produces scoria briquets for gas-fired barbecues, scoria gravel for use in aquariums, and scoria blocks for landscaping. This company also has been a winner for Hecla, although competition from other producers reduced profits in 1986. Colorado Aggregate has mines in Colorado and New Mexico.

Hecla continued evaluation of the Golden Dome project near Sierraville, California. The potential heap leach operation has estimated reserves of 1.3 million tons of 0.074 ounce per ton gold.

Hecla has about 800,000 tons of 0.10 gold in reserves at Stibnite near Yellowpine, Idaho. A feasibility study for a modest heap-leach operation is underway.

Full production continued at the Escalante mine in Utah. The open-pit mine produced 2,274,924 ounces of silver from 305,717 tons of ore.

### **Sunshine Mining Company**

Sunshine Mining company had its worst year in its 104 year history in 1986, recording a net loss of \$103,250,000. Employees were reduced from 1,065 to 437, cash reserves dwindled from \$77 million to \$28 million, and working capital fell from \$27 million last year to a negative \$20 million. The cause of the red ink was low silver prices adversely affecting precious metal operations and, a double whammy for Sunshine, low oil prices affecting the oil and gas group.

In January, Sunshine Mining Company officials met with representatives of the United Steel Workers Union to discuss cost-cutting measures at the Sunshine mine. Rumor had it that the measures included wage and benefit reductions and changes in work rules. Late in the month, the company opened its books to union auditors. On February 15, the big mine was closed for 30 days to reduce above ground silver inventories, idling some 400 workers. In late February, the miners unanimously rejected the cost-cutting proposal that called for a 25 percent cut in wages and benefits. The mine reopened in mid-March and negotiations about cost-cutting continued. Only 302 miners were called back. Salaried employees were also notified of impending pay cuts in March. In April, company's officials said all production would cease if union workers did not take a 35 percent wage and benefit cut. The new proposal included adjustable wage rates directly related to changing silver prices. The Steelworker's Local 5089 decided not to vote on the proposal, thereby rejecting the ultimatum. Management then offered each worker \$1,000 in stock if they would accept the cuts; the company would guarantee to keep the mine operating at current silver prices. This proposal was also rejected by the union negotiating committee. The mine closed on April 16. If the mine stays closed until after the present union contract expires in April, 1987, and the union remains at an impasse with Sunshine management, the company could legally hire non-union workers to reopen the mine. The April closure again idled some 400 men. The laid-off miners are eligible for Trade Adjustment Assistance benefits. About 30 employees were retained to operate the company's silver refinery. Prior to closure, the Sunshine mine produced 1,154,384 ounces of silver from 59,604 tons of ore.

Despite discussions, the union stuck to its guns and moth balling of the mine started on April 20. On April 29, the company cut 21 salaried positions from its Kellogg and Boise operations.

In June, Sunshine let its option on the St. Cloud mine in New Mexico expire. The option on the silver mine, owned by Goldfield Corporation, was acquired last year.

The 16 to 1 mine in Nevada continued to furnish ore for the Sunshine refinery on Big Creek until June when the mine was closed due to the low silver prices. The company wrote off \$4.2 million against the mine in December. Drilling continued at the Nivloc mine near the 16 to 1; it may be mined after the 16 to 1 is depleted. Sunshine began a small operation at the Weepah Pit located

about 20 miles from the 16 to 1. The gold ore from this mine is concentrated to Dore bullion and then shipped to the refinery at Big Creek.

Metropolitan Mines Corporation won an appeal to the Idaho Supreme Court and gained clear title to the ownership of the part of the Copper Vein that is on Metropolitan ground. In 1979, Sunshine tried to get ownership of the vein under extralateral rights, although the apex of the Copper vein had never been determined. Sunshine notified Metropolitan that it wanted to mine part of the vein on Metropolitan ground under a 1941 right-of-way agreement. In 1983, Sunshine dropped its claim but Metropolitan countersued to win clear title to the vein.

The state Supreme Court rejected damage suits against the United Steel Workers' union filed by families of four of the 91 miners who died in the tragic 1972 fire. The families contended that the union acted fraudulently in connection with safety at the mine.

Sunshine Metals (formerly Tentex Inc.) moved equipment into the old Seven-Up bottling plant in Coeur d'Alene in February. The California company was acquired by Sunshine last year and is a minter and fabricator of silver, including coins and medallions. A new product, Sunshine Golden Eagles in one, one-half, one-quarter, and one-tenth ounce denominations, were introduced late in the year. The gold coins were a success, judging by demand at year's end.

In a move designed to increase its financing and operations flexibility, Sunshine announced a plan in June to exchange all four of its issues of \$1,000 Silver Indexed bonds (valued at \$115 million) for new, higher-yielding bonds. The new bonds do not have any sinking fund requirements and can be paid off by cash or by shares of common stock. The replacement bonds were issued as follows;

- Feb. 15, 1995, 8 1/2 % bonds, indexed to 50 oz. of silver, to Aug. 15, 1994, 8 1/2% bonds indexed to 64 oz. of silver.
- April 15, 1995, 8 1/2% bonds indexed to 50 oz. silver to Nov 15, 1994, 9% bonds indexed to 64 oz. of silver.
- Dec 15, 1995, 8 1/2% bonds indexed to 50 oz. of silver to June 15, 1995, 9% bonds indexed to 64 oz. of silver.
- April 15, 2004, 9 3/4% bonds indexed to 58 oz. of silver to Sept. 15, 1995, 10 1/4% bonds indexed to 72 oz. of silver or 325 shares of common stock.

The offer resulted in an immediate 20 percent drop in the value of the company's stock. By September, 97 percent of the old 9 3/4% bonds and 83 percent of the overall bonds had been exchanged. In another financial matter, the company cancelled payments in June on \$122 million in loans used to acquire its oil and gas subsidiaries until the loans could be restructured.

To increase revenues from precious metal operations, Sunshine has leased the Big Blackfoot open-pit gold mine near Lincoln, Montana; purchased a 45 percent interest in Freeport's gold mine near Manhattan, Nevada; and has an interest in an open-pit gold mine, the Snow Caps mine (with First Sierra Assets), in Inyo County, California. These gold acquisitions could yield up to 200,000 ounces per year.

Negotiations continue concerning the future of the Trixie and Burgin mines in the East Tintic district near Eureka, Utah. A feasibility study is planned for the Burgin mine next year. The company has spent a reported \$10 million on the Burgin mine over the past few years.

### **Other Coeur d'Alene Properties and News**

Tap Resources Ltd. of Vancouver, British Columbia, found four mineralized zones at the Golden Chest mine east of Murray. The mine is owned by Golden Chest Inc. The area will be examined further next year as a potential bulk-minable, open-pit gold operation. Golden Chest formed a subsidiary, Golden Bear Minerals Corporation, to handle its mining properties.

Teck Inc. announced at year's end that the deep hole at the Gem State-Rock Creek property east of Wallace would be completed in 1987. The hole was drilled in 1984 to a depth of 4,800 feet. The Blue Jay mineralized zone is the target. Hecla Mining Company drove a mile-long tunnel on the property in 1940's.

Pacific Coast Mines, a subsidiary of U.S. Borax, dropped its lease on the 39 claims owned by Empire Gold Mines, Inc. The company drilled two holes in 1984 and two more in 1985 on the claims. Pacific Coast did sign a lease on the King of Pine Creek property on Pine Creek. Cominco dropped a lease on the King of Pine Creek and the rest of its substantial holdings on Pine Creek last year.

The Wallace City council rejected an offer from Wallace Silver Inc. to lease the mineral rights below the city for a 30 percent interest in any future mining revenues. Wallace Silver has been trying to consolidate mineral rights under the town for several years. The city council said they would consider future proposals from the company.

The Nabob custom mill on Pine Creek, leased from the Nabob Silver-Lead Company by Intermountain Mineral Engineers Inc., remained closed for the second year. Intermountain custom milled for several small mines that have been forced to close due to low metal prices.

Pensioners ended a two-year-old lawsuit against Bunker Hill, which claimed that benefits had been reduced over what they had been promised. The settlement was for \$500,000.

Another class action suit over medical benefits (against the old Bunker Hill Company) went to trial in October. It was the first trial of its kind in the country. About 3,000 former Bunker workers expected to have medical benefits as part of their retirement but all benefits were cut off

in 1982 after the mine had been closed for one year. The complex case hinged in part on whether Gulf Resources was responsible for the benefits or if the Bunker Hill Company, then a subsidiary of Gulf, was responsible. In November, a federal jury sided with the workers. Damages, if any, for the four year period since the mining complex closed down will be decided in another trial. There is some question about the new owners' (Bunker Ltd. Partnership) liability in this case as the purchase agreement between Gulf and the Partnership has never been made public. The medical coverage adds about \$700,000 in annual costs to about \$1 million already being paid for straight pension benefits.

The Environmental Protection Agency (EPA) began work on the fast-track phase of the clean up of the Bunker Hill area. Thirty men were hired to skim acres of lead-contaminated dirt from public parks and playing fields. The project was funded for \$600,000 and is just a small fraction of the total cleanup effort at the 21 square-mile Superfund cleanup site surrounding the Bunker Hill Smelter. President Ronald Reagan's reauthorization of the \$9 billion Superfund should put the clean-up at the smelter back on track, according to EPA officials.

The EPA study of the Bunker Hill Superfund site was supposed to be released in August but was delayed by haggling between Bunker Ltd. Partnership and EPA officials. The study is based in part on the 40,000 pages of corporate documents obtained under a search warrant by EPA last year.

The state of Idaho's \$50 million suit against Bunker Hill and other area companies concerning cleanup of the Silver Valley was settled in June for \$4.5 million. The state had little recourse but to settle, as the legislature failed to provide the Attorney General's office with funds to pursue legal action. The suit was filed in 1981, under provision of the federal Superfund legislation that allowed the states to try and recover damages for environmental cleanup. Under the \$4.5 million settlement, Gulf Resources will pay \$2.9 million; Asarco, \$783,000; Sunshine, \$509,000; Bunker Ltd. Partnership, \$175,000; and Coeur d'Alene Mines Corp., \$94,000 over a five-year period. Hecla Mining Company and Callahan Mining Corporation did not participate in the settlement. A seven-member Board of Trustees will decide how the funds are to be used.

In June, a six-member panel, the Consortium for Human and Animal Health, was formed by Governor John Evans to examine stream contamination problems from mining along the lower Coeur d'Alene River. State health officials are studying the lower river and Coeur d'Alene Lake to determine the toxicity of metals deposited in these bodies of water by years of upstream mining activity.

In August, the state gave the Bunker Limited Partnership until September to come up with a plan to control dust blowing from the old 150-acre tailings pond at the mine. In November, EPA officials and federal marshals broke the lock off a gate leading to the pond site and collected dust samples to study for hazardous substances. The lock was replaced and the key to the new lock given to the Partnership.

William A. Griffith, Chairman of Hecla Mining Company, received his fifth Wall Street Transcript gold award. Justin Rice, Chairman of Coeur d'Alene Mines Corporation, received the silver award and Charles D. Snead, Jr., of Callahan Mining Corporation, the bronze award.

One of the best known figures in Coeur d'Alene mining, August George Voltolini (Gus to everyone) passed away in August. Involved with the early Lucky Friday Mining Company, Gus became Hecla's personnel officer. Known as a practical joker and for frequently "firing" Hecla executives, he is better remembered as a good friend to many miners in the Silver Valley.

### **Other Producing Metal Mines (Figure 3)**

#### **Clayton Silver Mines, Inc.**

The Clayton Silver mine closed on May 24, due to depressed silver prices. The company celebrated its 50th birthday last year. The shutdown cost 35 employees their jobs, in spite of greatly increased production from 225 to 350 tons-per-day, and salary and wage cuts. The small company had a \$529,000 loss for the first half of the year. In April, it was decided to stop pumping the lower levels of the mine. The mine was flooded by the Borah Peak earthquake in 1983 and \$70,000 worth of new pumping equipment was installed. The new equipment should enable the mine to be pumped out when prices improve.

#### **Cyprus Minerals Company**

Cyprus Minerals Company was spun off as a separate entity by Standard Oil of Indiana (Amoco) last year. Cyprus moved aggressively in 1986, purchasing the Sierrita copper/molybdenum mine in Arizona from Duval Corporation. The plant at Sierrita contains a molybdenum roaster, so moly concentrates from Sierrita, as well as the company's other copper mine at Bagdad, Arizona, and the Thompson Creek mine in Idaho, can be converted from a sulfide concentrate to a more marketable oxide. Cyprus is now the third-largest producer of molybdenum in the world. During the year, the company established a producer price for the metal, an indication of its important position in the world's moly market.

The company also entered into a joint venture with Cabot Corporation to develop the Sierra Blanca beryllium deposit in Texas. As noted, a setback for the company this year was the loss of two major coal contracts due to the LTV Steel bankruptcy.

In Idaho, the company adopted a mining plan late last year that included a 2 1/2 year mine out of the Thompson Creek Molybdenum mine. The plan included halting preproduction stripping and mining out the orebody consisting of 17.5 million tons of ore. The company wrote down the \$398 million value of the mine in 1985.

Unusually high productivity during the first six months of 1986 led to a stock pile of molybdenum concentrates. The mine closed for a month in October so that production could balance with sales. There were no lay-offs.

A new operating plan was initiated in November. Cyprus will lay off 100 of the 400 employees at the mine early next year. The laid-off workers will be considered first for

### Figure 3

about 80 to 100 jobs at Cyprus' Bagdad and Sierrita copper mines. The company has a buy back provision for employees who purchased new homes built by Amoco when the mine was developed. The new plan cancels the 2 1/2 year mine out plan and calls for an indefinite operation of the mine. The 25,000 ton-per-day mill will only operate five and 1/2 months a year when electrical rates are lowest. In addition, there will be month-long shut downs in October and November when employees will take vacations. During 1986, Thompson Creek produced 15 million pounds of MoS<sub>2</sub>. This will be reduced under the new mining plan to about 9 million pounds next year.

### **Nerco Minerals Company**

Nerco operated the DeLamar mine in Owyhee County all year without interruption. The company is studying the possibility of heap-leaching low-grade ore stock piled at the mine. The new facility will process about 7 million tons of ore, recovering 65,000 ounces of gold and 1.4 million ounces of silver over a seven-year period. The 2,200 ton per day, closed-vat cyanide mill produced about 1.7 million ounces of silver and 28,000 ounces of gold in 1986. The mine employs 150 people.

Ore is being mined from the North DeLamar open-pit at about 25,000 tons per day. The ore grades two ounces of silver and 0.023 ounces of gold per ton. Plans call for opening a new open pit, the Glen Silver, in 1987-88. The main ore mineral at DeLamar is naumannite, the silver selenide. The company continues to experiment with ways to reduce the toxic selenium in tailings.

Attempts to use zeolites as molecular sieves for extracting selenium were unsuccessful but the company is looking at other innovative methods of selenium control.

### **Golden Maple Mining Company**

Golden Maple abandoned plans for a heap-leach operation at the Valley Creek mine near Stanley and decided to haul ore to U.S. Antimony Corporation's (USAC) 300 ton-per-day custom mill, 35 miles away at Preacher's Cove on the Yankee Fork of the Salmon River. In October, USAC entered into a five-year joint venture with Golden Maple and will do all the mining and milling at the Valley Creek mine for 70 percent of net profits. Through October, USAC milled 2,367 tons of Valley Creek ore and will mill 8,500 more under the current contract. Ore grades vary from 0.12 to 0.21 ounces of gold per ton. USAC will open the No. 2 tunnel at the mine; it is 75 feet below the open-pit now being mined. The mineralized zone is some 2,000 feet long.

### **U.S. Antimony Corporation (USAC)**

In other matters, USAC continued to truck ore from the Custer slide and the Custer open-pit on the Yankee Fork (subleased from Excell Minerals Inc., which has a lease from Lucky Custer Gold

Inc.) and from the Settles and Castle drifts on Estes Mountain to the Preacher's Cove mill. The mill operated 24 hours a day, seven days a week. The company has a contract with Atlantis Mining and Manufacturing Company to process gold and silver ore from the Atlantis mine in Colorado Gulch near Hailey. Exploration by USAC at the Red Bird and Rob Roy mines in the Bay Horse district that was started last year was put on hold.

### **Coeur d'Alene Mines Corporation (Thunder Mountain)**

On September 26, Cda Mines dedicated the new Thunder Mountain heap-leach gold mine in central Idaho. The mine will produce about 27,000 ounces of gold per year over the five-year life of the project. In March, the company purchased the 10 percent interest in the mine still owned by Phillips Petroleum for \$1 million. Thunder Mountain Gold has a 10 percent interest in the mine that will increase to 30% after preproduction costs are recovered by Cda Mines. The mine will only operate 5-6 months of the year due to severe winter conditions at the 8,000-foot mine elevation in this remote part of the state. Ore is leached on four 240 by 300 foot pads, each with a capacity of 31,000 tons. Recovery is by the Merrill Crowe process. The pads use a 32-day leach cycle. The mine has reserves of 1.7 million tons, with potential for additional reserves near Lightning Peak. Stripping ratio is less than one to one on the shallow orebody.

In 1986, 237,000 tons of ore averaging 0.077 ounces of gold were processed at the Thunder Mountain mine, yielding 11,111 ounces of gold and 9,248 ounces of silver. The mine contractor is the Argee Corporation of Denver, Colorado. There are about 84 men employed in mining and two in the recovery mill. About 3,500 tons ore are mined each day. Dore from the mine is sold to Englehard Industries West, Inc.

### **Pioneer Metals Corporation**

Pioneer purchased the Stibnite heap-leach gold mine from Mobil Corporation for \$2.95 million. The Mining Finance Corporation is a 50 percent partner in the deal, coming through in a pinch with two-thirds of the capital needed for the purchase. TRV Minerals, owner of 25 percent of the West End pit, owns 18 percent of Pioneer's stock. Mobil purchased Superior Oil in 1984 and decided to divest Superior's mineral holdings, including the Stibnite mine. Superior brought the property on line in 1982 at a cost of \$9.5 million. Pioneer resumed mining at Stibnite in September. A division of Peter Kiewit and Sons is the mining contractor. The mine is expected to yield about 25,000 to 30,000 ounces of gold per year over a short six-month season due to severe winters at the 7,000 foot mine elevation. There are five leach pads at the site and the ore averages 0.08 ounces per ton and is easily leached. When operating, about 120 men are employed in mining and 14 more in the recovery plant. Production next year is scheduled to start in June.

### **Rothchilds Corporation**

Rothchilds has reopened the old Cache Industries mill on Warm Springs Creek near Ketchum and plans to operate the facility as a custom mill. The company also has an option on the Vienna mine north of Ketchum that will be evaluated next year.

## Silver King Mines

Stockpiled ore from the Iron Dyke mine in Oregon was processed by Silver King at its mill at Cuprum, Idaho. About 10,000 tons, averaging 0.04 gold were mined and will be milled next year. The company is considering an exploration program at the Blue Jacket mine.

## Placer Operations

The Shoshone-Bannock indians in southeast Idaho may have gold on their property but they want little to do with it. The gold was found during a study on the reservation by the U.S. Geological Survey. It is the well-known fine gold of the Snake River. The fine material has eluded placer operators for years, as it is very difficult to concentrate. According to the press, the tribe's fishery and wildlife is more golden to them than the elusive metal.

The search for the yellow metal remained popular with many of the state's citizens and a lot of tourists. The Department of Water Resources processed 452 one-stop permits in 1986. This is the permit needed for small placer mines and "hobby" dredge operators.

Larger-scale placer mines in the state included the following:

Placer	Company	No.employed	County
Golden Chariot	Roeder Mining Inc.	3	Elmore
Butte Gulch	Nordstrom Placer mining	3	Shoshone
Sherwin Bar	A & T Mining	7	Idaho
Gold Springs	Earl Johnson	2	Idaho
Walker-McReynolds	Ophir Cr. Same	3	Boise
Middle Fork Placer	Orogrande Gold Co.	2	Elmore
Gold Duck	CSC Mining Co.	2	Shoshone (not sure this last one is a placer)

## Phosphate Mines and Plants (Figures 3 and 5)

### Introduction

According to the U. S. Bureau of Mines, production of phosphate rock in the United States decreased 26 percent nationwide, from 51 million tons last year to 38 million tons in 1986. The value of marketable phosphate rock decreased from \$23.67/ton. Exports fell 12 percent from 10.3 million tons to 9.0 million tons. The quantity of rock for producing phosphoric acid fell 17 percent, but increased 192 percent for superphosphate production. The declining need for phosphate reflects continuing problems in the agricultural sector and competition from foreign producers, both problems symptomatic of the past few years. About two-thirds of the phosphate rock, fertilizer, or other phosphate products in the United States are exported. Our competition comes from Morocco, Tunisia, Senegal, and Togo in Africa, and Jordan, Syria, and Israel in the Middle East. In the U.S., 93 percent of phosphate rock is used for fertilizer. The rest is used to make elemental phosphorous or purified phosphoric acid.

In Idaho, agricultural phosphate producers were still in a soft market but elemental phosphorous plants had a good year. This is because there is a strong export demand for finished products containing phosphorous but little demand for phosphate rock or fertilizer. Exports are the name of the game in the phosphate business. Idaho produces about nine percent of the country's phosphate.

### **FMC Corporation**

In November, FMC Corporation and Monsanto (Idaho's and the country's largest producers of phosphoric acid), sued Belgium and Israel over alleged dumping of

Figure 5

phosphoric acid. The two countries account for about 86 percent of U.S. acid imports, estimated at 69 million pounds annually, up from six million pounds in 1981. Foreign imports of acid have risen from one percent to 14 percent of the U.S. market in this same period. The suit alleges that the two countries are selling acid below cost and are receiving unfair aid and subsidies from their governments.

### **Beker Industries**

Beker Industries filed for protection under Chapter 11 of the federal bankruptcy laws in October of last year. In May, Beker announced the closure of its fertilizer plant, laying off most of its 225 employees and leaving only a small work force of about 30 people to fill orders from stockpiles and continue production of super phosphoric acid. Conda Partnership, a joint venture between Western Cooperative Fertilizer and Beker, announced the closure of the jointly-owned calcining plant next to the acid plant at Conda in early August.

A bid of \$21 million by Weiss, Peck and Greer, a New York investment firm, for Beker Industries fell through in August. After the WP and G offer, Gary Greer, a former senior vice president and CEO for Beker, offered to lease the Conda Complex with an option to buy for Nutri-Green Inc, an investment group formed for the purpose. Beker's creditors were amenable to the deal but Western Cooperative Fertilizer Ltd, a Calgary, Alberta, Company and half owner of the Cooperative, balked at letting anyone use the calcining facilities for manufacturing fertilizer. The Canadian company bought half of Beker's phosphate leases and the calcining plant in 1979 for \$65 million. Western had reportedly made arrangements to get phosphate from Florida when the calcining plant closed and did not want the fertilizer plant in Idaho to operate. The Nutri-Green offer fell through later in the year.

In September, Washington Corporation, the former mine contractor for the Coop, announced jointly with Western Cooperative that they would buy out Beker's interest in the plant. Washington Corp. claimed that the Partnership owed it millions of dollars in mining expenses and had not paid for any mining costs for the past year. Washington would release its claim

against the Partnership and pay an undisclosed amount to the Partnership's creditors for the half interest.

Another plan surfaced in November when Erol Beker, the founder of the company, and his son Erol Y. Beker (both former executives of Beker who resigned in June of last year) offered to pay \$28.4 million in cash and \$5 million in notes to creditors and purchase 88 percent of the company's stock for \$29.4 million. After the purchase, two new companies would be formed, one, the new Beker Company and the other, the Conda Company consisting of the fertilizer operation in Idaho. The offer has to be approved by lenders, creditors, stock holders, and the bankruptcy court.

### **J.R. Simplot Company**

J. R. Simplot Company announced a three- to six-week closure of its Pocatello fertilizer plant in May. On June 27, 400 of the plant's 540 employees were furloughed for six weeks, the first such shut down in the plant's 42 year history. The purpose of the closure was to reduce excess inventories resulting from the soft fertilizer market. The company's Smoky Canyon mine was also closed, idling 98 workers at the mine and another 45 at the Conda calcining plant. In August, the Smoky Canyon mine and the Pocatello plant were reopened and all employees were back on the job by mid-month. Simplot finished a \$50 million plant expansion at the Pocatello plant last year.

Production from the Gay mine leased by Simplot and FMC, and operated by Simplot, continued as usual. The mine employs about 167 men. Mining was expanded onto an additional 2,300 acres (called the "South 40") that should ensure the mine's life for many years. About 85 percent of the ore from the Gay mine goes to FMC's plant and the remainder to Simplot's Pocatello operation.

### **FMC Corporation**

FMC Corporation operated its elemental phosphorous plant at Pocatello all year. In May, a fire damaged the No.1 furnace, but there were no injuries. The furnace, rebuilt in 1982, is one of four in the plant, the largest such facility in the world. The plant was going at full capacity when the fire occurred. The company rebuilt another furnace in July at a cost of some \$10 million. As noted, FMC gets their phosphate from the Gay mine, which is leased jointly with, and operated by, the J. R. Simplot Company. The FMC plant employs over 500 workers, produces about 250 million pounds of elemental phosphorous per year, and uses about 15 percent of the electricity generated by the Idaho Power Company. Quartzite for furnace slag is quarried from the Wells Cargo quartzite quarry by a contractor, the Bannock Paving Company.

In September, FMC announced plans to spend about \$15 million over the next three years installing emission control equipment on its two large calciners at the Pocatello plant. Plans call for installing scrubbers and new water recycling systems. The company completed a \$16 million environmental control project in 1977.

## **Monsanto**

Monsanto operated its elemental phosphorous plant at Soda Springs at 80 to 85 percent capacity till August, and then went to 100 percent due to the closure of the company's sister plant at Columbia, Tennessee. Monsanto gets its phosphate from the Henry mine operated under contract by Dravo-Soda Springs. Mine production is approximately one-million tons of phosphate rock per year. About 100 people are employed in mining and 400 at the plant. Quartzite for slag is mined from the company's quarry under contract by the Washington Construction Company.

## **Kerr-McGee**

Ferrophosphorous slag, a waste product of Monsanto's operation, is shipped across the road to Kerr McGee's vanadium extraction plant. About two million pounds of the steel additive is extracted from the slag each year and Kerr-McGee is looking at ways to increase production. The plant came on-line in 1963 and employs 44 workers. Limestone used in the extraction process is currently obtained from the Trail Canyon mine.

## **Stauffer Chemical Company**

Stauffer Chemical Company mined 364,204 tons of phosphate ore from the Wooley Valley mine and shipped 309,670 tons to its elemental phosphorous plant at Silver Bow, Montana. The company employs 29 people at its Idaho operation. Stauffer was acquired last year by Chesebrough-Pond's. Unilever N.V., a Dutch-Anglo concern, took over Chesebrough-Pond's this year, and Stauffer is reportedly for sale by the new parent.

## **Other Phosphate News**

Soda Springs Phosphate Inc. was shut down in June until it could meet state air quality standards. The scrubber in the stack at the plant was rebuilt and modified, and the plant was soon back in business. The small facility employs nine workers and ships about 100 tons of fertilizer per day.

In December, a proposal for a new plant in Soda Springs was made by Evergreen Resources. The company wants to rent seven acres from the city to locate a small granular phosphate fertilizer plant that had been purchased in Long Island, New York. The facility would initially employ about 20 people, and would use tailings from Kerr-McGee's vanadium plant for feed.

Chevron began operation of its \$100 million phosphate fertilizer plant near Rock Springs, Wyoming, in July. The plant will have an annual capacity of 350,000 tons of dry fertilizer. In addition to the new plant, Chevron has invested \$150 million in expanding its phosphate mine at Vernal, Utah, and in constructing a 95-mile-long pipeline to transport slurried phosphate ore from the mine to the Wyoming plant. Sulfur to make sulfuric acid needed for fertilizer production will

come from sour gas at Chevron's Carter Creek natural gas plant in Wyoming. The new facility is expected to offer stiff competition for J.R. Simplot Company's fertilizer plant in Pocatello.

N.A. Degerstrom, Inc., announced tentative plans to build a plant to extract gallium and other metals, including silver, zinc, and potassium, from "treater dust" produced by Monsanto's and FMC's elemental phosphorous plants. Degerstrom has been developing the process for six years.

Alumet did not mine this year from the Lanes Creek mine. The company is still in litigation.

## **Industrial Minerals (Figure 6)**

### **Limestone**

*Ash Grove Cement West Inc.* had a normal year as Idaho's only cement producer. The plant at Malad produced approximately 350,000 tons of cement in 1986. Six men were employed in mining limestone from a quarry behind the plant and 70 more work in the cement plant. Silica for making cement is quarried a short distance from the plant, almost adjacent to the limestone quarry.

The *Marble Shop* processed about 25,000 cubic feet of travertine during the year. All material was from stockpiled rock and no new travertine was mined from the company's *Fall Creek quarry*. There are seven men employed at the processing plant in Idaho Falls. Almost the entire year's production went to facing the 999 Peachtree Office Building in Atlanta, Georgia. Imported travertine is not as competitive as in recent years because of the decline in the value of the dollar, but the general trend in facing stone has been towards using granite, so travertine is off in demand. The company is looking to smaller contracts for the near future.

*Treasure Valley Calcium* employed four men in its plant in Preston and three men in mining limestone from the Treasure 1 and 2 quarries. The company processed about

Figure 6.

12,000 tons of limestone that was shipped to Simplot's phosphate plant in Pocatello and used as an animal feed supplement.

The *Nez Perce tribe* shipped stockpiled limestone to Potlatch Forest's paper mill in Lewiston. The tribe employs five people in the operation. No new limestone was mined from the *Mission Creek quarry* during the year.

### **Silica**

*Unimin's* plant at Emmett remains the only commercial silica operation in the state. The company employs 14 people in mining and packaging silica, which is used for bottle glass and

sandblasting. Almost all production is sold in the Pacific Northwest. The sand for the operation is mined from ancient lake bed deposits exposed on Freezeout Hill near Emmett.

### **Diatomite**

Several tons of diatomite were shipped to Japan for testing from the *Clover Creek* deposit near Gooding. Two other firms are interested in the large deposit that is for sale or lease.

### **Perlite**

*Oneida Perlite* mined about 2,000 tons of perlite and pumice from the *Wrights Creek mine* outside of Malad. The plant produces expanded perlite for light-weight aggregate, filtration, and fireproofing. Two employees operate the mine and another 14 work in the plant. The plant and mine are reportedly for sale.

### **Pumice**

*Hess Pumice Inc.* finished its new \$1.7 million pumice processing plant at Malad in April. The 70-foot-high building in Malad's Industrial Park will solve problems with the old plant, built in town in 1959 and badly outdated. The new facility is computer controlled and will employ two five-man shifts. The plant has a capacity to dry, grind, bag, and ship about 20 tons of pumice per hour. In the summer, five men extract the pumice from the company's *Wrights Creek open-pit mine*, located 22 miles northwest of Malad. Hess does about \$1.5 million in sales annually. Funding for the expansion project came from Industrial Revenue bonds (purchased by Idaho First National Bank) and a \$200,000 federal Housing and Urban Development Grant.

*Ancor Inc.* mined about 10,000 tons of pumice from the *Sunnyside mine*. The material is used for light-weight aggregate at the company's block plant in Idaho Falls. Ancor is marketing a new paving stone that is very successful and competes with asphalt and poured concrete. The new material consists of four interlocking dog-bone shaped tiles to a square foot. The material comes in various colors.

*Producers Pumice* mined 9,235 tons of pumice from its *Rock Hollow mine* in Bonneville County. Two men were employed in mining. All production is used for lightweight aggregate at the plant in Idaho Falls.

### **Garnet**

*Emerald Creek Garnet Milling Company*, located at Fernwood in Benewah County, maintained its title as largest garnet producer in the United States. The company had another good year in 1986, producing 20,000 tons of garnet (up from 14,400 last year). The material sells for between \$140 and \$170 a ton, for net sales for the year of about \$3 million. The traditional use of garnet as an abrasive continues, but more of the material is used for filtration, sand blasting, and high pressure

water-garnet cutting equipment that can cut through steel plate. The company operates with four dredge/washing plants fed by draglines, a jig mill, and a processing plant. The operation employs about 12 men in mining and another 18 in processing. Emerald Creek is also the largest placer operation in Idaho.

## **Clay**

*A.P. Green Refractories Company* operated its plant at Troy all year. The company, a subsidiary of *U.S. Gypsum*, was reportedly being sold to *Adience Equities Inc.*, of Pittsburgh, Pennsylvania. However, the deal fell through at year's end. The Troy plant manufactures fire brick and is a major supplier of refractories to aluminum companies in Portland. The plant employs 13 people and gets its clay from pits near Helmer.

*Clayburn Industries* of Abbotsford, British Columbia, shipped about 1,000 tons of clay from the old Simplot operation near Bovill. Heavy rains shut down mining early this year but the company plans to operate next year. The clay is calcined in Idaho and then shipped to Clayburn's refractory brick plant in British Columbia. The mine and mill are leased from the J.R. Simplot Company.

## **Scoria**

*Lava Flow Products Inc.* shipped 60,000 cubic yards of crushed scoria for use in gas barbecues, landscaping, aquarium gravel, and road mix. The company has a processing and packaging plant at Mountain Home and employs six men in mining the volcanic material and 34 more in the plant.

## **Stone**

Several companies continued to mine Oakley Stone for flagstone and decorative facing material. *Idaho Quartzite Corporation* obtained quartzite from the Amy-Ashley quarries. Its plant at the state prison employs 12 men, who turn out about 1,500 tons of thin quartzite per year. Another 11 workers are employed at the quarry. Other stone producers in Oakley include *Northern Stone Supply* (operates the *Rocky Mountain Quartzite Quarry*) and *Oakley Valley Stone*.

## **Gemstones**

*Spencer Opal Mines* employs four people for mining and guiding rock hounds at the Deer Hunt Opal mine. The beautiful opal found in Clark County is highly prized by both lapidaries and mineral collectors. The mine changed ownership during the year. Rock hounds have access to the fee collecting area from May 15 to September 30.

The U.S. Forest Service sold 1,014 permits and registered 510 visitors to the garnet digging area near Fernwood. The popular rockhound and tourist attraction offers visitors a chance to dig for the Idaho's official state gem, the star garnet.

## **Zeolites**

Zeolites were mined by *Teague Mineral Products* from open-pits near Jordan Valley, Oregon. The company crushes, dries, and sizes zeolites (clinoptilolite) at a plant in Adrian, Oregon. Teague is acknowledged as one of the more successful producers of zeolites in the country. The company plans to bring a new mine on stream in Idaho and use the high whiteness material as an anti-caking agent and for agricultural applications. Zeolites have a wide range of uses including molecular sieves, ion exchange (water softeners), gas adsorption (to clean stack emissions), odor control, agriculture, and radioactive waste cleanup.

*International Minerals and Chemicals Corporation* (now Aimcor) leased zeolite deposits located west of Murphy, Idaho, in Owyhee County from *Double Eagle Petroleum and Mining Company*. The exceptionally pure clinoptilolite reserves are being evaluated for best market potential.

*Tenneco Specialty Minerals Company* (a subsidiary of Tenneco Inc.) holds a large number of claims for zeolites in Idaho, just east of Jordan Valley, Oregon. The deposits were acquired from Phelps Dodge, who picked up the claims when it acquired Occidental Petroleum's Industrial Rock and Minerals Division.

## **Exploration (Figure 7)**

### **Introduction**

During 1986, there was considerable mineral exploration in Idaho, more so than in recent years. A number of Canadian companies are active in the state and several have announced development or mining plans. One of the reasons for this flurry of activity by the Canadians (especially junior companies) may be financing by "flow-through shares" that are a great tax advantage for Canadian investors and a welcome source of capital to Canadian mining interests. Although funds from flow-through shares can only be used in Canada, these funds may have freed up more traditional sources of capital that can be used for exploration elsewhere. An increase in exploration activity south of the Snake River Plain is the result of the search for Nevada-type, bulk-minable precious metal deposits. Basin and Range structures are good targets for these deposits and south Idaho is in the Basin and Range province.

At the end of 1986 there were a total of 73,978 active mining claims in Idaho recorded with the Bureau of Land Management. The counties with the most claims are Blaine, 7,163; Boise, 7,976; Custer, 18,849; Idaho, 10,483; Lemhi, 17,338; and Shoshone, 15,399. One company, Shama Minerals, staked over 4,200 claims during the year.

### **Coeur d'Alene District**

## Other North Idaho

*St. Joe Minerals* is looking for a joint venture partner for its precious metal holdings on Freeman Creek (north of Salmon) and for its gold play near Grangeville. The Freeman Creek occurrence was drilled last year and is reportedly a mineralized thrust fault.  
Figure 7

*Cominco* had an active drilling program near Trestle Creek, north of Clark Fork in Bonner County. The company also drilled targets on its 138-claim block located between Crescendo and Blackdome peaks in Shoshone County, south of the St. Joe River. Both projects are part of the company's basin-wide study of the Prichard Formation. How or if the takeover of Cominco by *Teck Inc.* and other investors will affect these programs is unknown.

*Normine Resources Ltd.* continued evaluation of the Buffalo Gulch and Friday groups in the Deadwood Mountain gold zone near Elk City in Idaho County. In May, Normine and *Amir Mines* formed a joint venture with *Glamis Gold Ltd.* Work on the Friday property (near Orogrande) indicates possible reserves of 10 to 14 million tons of ore grading 0.035 to 0.050 ounces of gold per ton. Drilling continued this year, with geochemical and geologic studies and bulk testing of the Friday property. Thirty five rotary holes on 200 foot centers (totaling 6,500 feet) were drilled in the North Buffalo Gulch zone. Two other anomalous areas were found along the eight-mile-strike length of the zone. A pilot heap-leach project is planned for next year.

*Alotta Resources Ltd.* (a subsidiary of Tundra Resources, part of the Applegath Group of companies) outlined a gold show at the mineral zone near the Madre d'Oro property. Other targets explored included the Golden Eagle Claims near the Gilt Edge mine and a vein near the Four Mile mine. Drilling this summer indicated reserves of 758,000 tons averaging 0.08 ounces of gold in the Mineral zone. These mines are near the townsite of Golden, just west of Elk City.

*Nevex Gold* entered a joint venture to earn a 60 percent interest in the 620 acre Majestic claim block adjoining its Robinson Dyke mine near Dixie. The Majestic is controlled by Mines Management Inc. Nevex plans to have its heap-leach operation at the Robinson Dyke underway next summer, after two years of evaluation. Any ore found on the Majestic ground would be processed at the Robinson Dyke facility.

*United Gold Corporation* announced plans to begin mining at the Erickson Gold Reef mine near Elk City. Reserves are estimated at three million tons containing 240,000 ounces of gold (average 0.08 ounces per ton). United has spent about \$1.1 million on the property so far and will spend another \$6-8 million to bring the open-pit gold mine on stream.

*Naneco Resources* reportedly purchased the Idaho Champion gold property near Orogrande. The claims contain leachable gold averaging 0.056 ounces per ton.

Two men extended a drift 55 feet at the *Gold Dust mine* in Latah County. Installation of a small experimental mill is planned for next year.

A tunnel was opened at the *Gold Queen mine* in Latah County. Two men worked part-time at the property.

A family operation was reportedly started in the Marshall Lakes district. A small stamp mill is being used to process ore from the mine located on Bear Creek.

### **Salmon Area**

*Tenneco Minerals* drilled the area around the old *Kittie Burton* and *Ulysses* mines in the Indian Creek district north of Shoup. Assays were being studied at year's end. On November 12, *Echo Bay Mines* purchased all of Tenneco's precious metals holdings for \$130 million. The old Tenneco Minerals is now called *CanAm Gold Corporation*. Tenneco has been active in Idaho over the past few years, with programs at the

*Mizpah* mine in Latah County and the *Parker Mountain*, *Rabbitsfoot*, and *Singeiser* mines in Custer County.

*Metron Resources Corporation* submitted a plan to the U.S. Forest Service to mine and process gold ore from their property on *Porphyry Ridge* located near *Panther Creek* and *Porphyry Creek*, about seven miles south of the *Blackbird* mine in Lemhi County. The plan called for using a thiourea-leach process.

*Noranda Inc.* drilled 3,600 feet on the old patented claims of the *Yellowjacket* mine in Lemhi County. The company also drilled some holes in the *Black Pine* district located in Cassia County in southern Idaho.

*FMC Corporation* continued a 100-hole drilling program on *Ditch Creek* south of *Gibbonsville*. The company is looking for lode gold beneath old placer workings in the creek that were worked in the 1930's.

*Eagle Claw Mining* (owned by *Golden Express Corporation*) leased claims on *Anderson Ridge* near *Gibbonsville* and started work on a 1,000 foot long drift. The company is looking at the gold prospect in addition to other holdings in the area.

*Golden Express Associated* and *Sterling Industries* reported progress at the *Clara Morris* mine and the *McDonald* property near *Gibbonsville*. A tunnel has advanced 270 feet. *Centennial Development* from Salt Lake City will start a development program next year. Any ore mined during development will be processed at U.S. Antimony's custom mill on the *Yankee Fork* of the *Salmon River*.

## **West-Central Idaho**

*Golden Reef Joint Venture* agreed to pay the state a \$20,000 fine for water quality violations at the Dewey mine in the Thunder Mountain district. The company has been negotiating the settlement with the Department of Health and Welfare for two years. The property has not operated during this time and is in ownership litigation.

*Goldstone Minerals Resources Corporation* acquired a 25 percent interest in the Lucky Ben prospect near Warren from Golden Dividend. There has been about 1,100 feet of drifting on the Lucky Ben vein, and some trenching and sampling at the Goldstone in the past.

*American Independence Mines and Minerals* employed five men at the Antimony Rainbow and Fourth of July claims in Valley County near Yellowpine. The crew did some long-hole diamond drilling, cross cutting and stoping. The company is studying the feasibility of building a 75 ton-per-day mill at the tungsten, antimony, gold, and silver property.

*Amselco* evaluated claims at the Golden Gate Tungsten mine near Yellowpine. A few holes were reportedly put down on the former tungsten producer.

The *Heritage Mining Company* did some underground work on their holdings on Smith Creek that drains into Big Creek in Idaho County.

## **East-Central Idaho**

*Getty* dropped its program at the Triumph mine. The option was picked up by *Peregrine Mining Company*, which evaluated all of the data from Getty's project and earlier drilling at the mine by *Bear Creek*, and then dropped their option late in the year. *Triumph Mineral Company, Inc.*, the property owner, is looking for a party to lease or purchase the mine.

*Shama Minerals* has leased the fluorite claims held by *J.R. Simplot Company* just east of Challis. The property is now called the Marantha mine.

*Atlantis Mining Company* continued underground evaluation of the Atlantis mine in Colorado Gulch near Hailey. The company has a contract with U.S. Antimony Corporation (USAC) to process ore at USAC's Preachers Cove mill. The main target in the mine is the Magdalena vein, a gold-bearing chalcopyrite vein about 18 inches wide that can be traced for some 3,000 feet underground and on the surface.

The *Yanke Machine Shop* continued exploration at the Greyhound mine in Custer County. The Lower Rufus tunnel was extended 150 feet for a total length of 1,160 feet. A 20-foot raise was started on one of two small ore shoots cut in the tunnel extension. The company is applying for patent on 400 acres adjacent to the present mine site. Evaluation of the Greyhound will continue next year.

The *Sunbeam Mining Company* hopes to begin mining at the Sunbeam mine on Jordan Creek, a tributary of the Yankee Fork of the Salmon River, next year. They are waiting for final approval for the project and plan to begin work on the closed-vat cyanide leach mill in 1987. This year a bridge was built over Jordan Creek, a road completed to the mine site, and some drilling done. The mine should employ about 85 people.

Two men worked at the Lost Packer mine on a drilling program. The *Lost Packer Mining Company* plans to ship some ore next year.

### **South-Central Idaho**

*Atlanta Gold Corporation* continued evaluating a potential heap-leach operation on Atlanta Hill in the old Atlanta district. The company has drilled over 175 reverse circulation holes for a total of 48,821 feet and 15 diamond drill holes totalling 3,300 feet along the Atlanta mineralized zone, concentrating in the area of the Monarch mine. The reverse-circ holes were drilled to an average depth of 265 feet. The project could become a 10 year, quarter million ton-per-year, heap-leach operation. Drilling has proved up 14 million tons of 0.05 gold per ton. Early plans call for permanent leach pads and a 60-day leach cycle. The property is subleased from Yanke Machine Company, which has a lease from the A. H. Burrough's estate.

*Billiton Minerals* drilled five reverse-circulation holes totaling 1,600 feet in the Lava Creek district, two miles north of Craters of the Moon National Monument. These claims were looked at by *John's Manville* two years ago. Billiton also has a joint venture underway with Cominco east of Sandpoint. The company is conducting a regional study in the Idaho batholith for precious metals.

*Goldfields* was active at the Hornsilver mine near the Champagne mine in the Lava Creek district and plans to drill about 40 holes on the property. The mine is leased by *Rothchild's Corp.* (the successor to Cache Industries). *Phelps Dodge* looked at these claims a few years ago.

*Hambro Resources Inc.* signed a joint partnership agreement for a 60 percent interest in the Blackstone mine with *Circa Inc.* early in the year. *Circa* leases the mine from the Blackstone Mining Company. Nine holes were drilled on the property in February. *Circa* worked the mine intermittently from 1982 to 1984, processing the silver, copper and gold bearing ore at its plant in Mountain Home.

### **Boise Basin**

The Ophir mine in the Boise Basin was examined by *Frontino Corporation*. Results were being evaluated at year's end.

*NCE Mining* continued work at the Silver Bar mine near the Banner mine north of Idaho City. The company completed a 10 by 10 foot trackless drift at the silver mine. It hopes to build a mill and operate the mine at about 1,000 tons per day.

### **Southeast Idaho**

A Pocatello geologist, Jay Valcarce, and his partner, Merle Newell, filed 204 claims in the Caribou National Forest on Mink Creek and 128 claims along the county line between Bannock and Oneida Counties near Cherry Creek. *Meridian Minerals* drilled the Mink Creek, and *Freeport Minerals* the Cherry Creek, claims late in the year. Both plays are for low-grade, bulk-minable deposits similar to mines in Nevada. Results from both drilling projects were being evaluated at year's end.

*Exvenco Resources* continued drilling its Artesian property located 20 miles southeast of Twin Falls. The company is in a joint venture with *Chutine Resources*. The Carlin type mineralization was sampled last year and several holes were put down in 1986. *American Copper and Nickel Inc.* staked and was evaluating over 300 new claims just south of the Artesian property.

*Four Seasons Resources Ltd.* began a drilling program at its Lidy Hot Springs, epithermal gold property near Dubois. The company did geochemical sampling and geologic mapping last year. Eklund Drilling Company drilled four 400-foot holes. A second phase drilling program was planned for later in the year.

*Meridian Minerals* is drilling claims near Middle Mountain south of Oakley. The target is reportedly another no-seeum gold prospect.

### **Southwest Idaho**

*Ican Resources Ltd.* and *Canu Resources Ltd.* began evaluating a gold occurrence at the old Almaden mercury mine about 12 miles east of Weiser. The property was acquired from *Homestake Mining Company*, which drilled the site a few years ago. The Canu-Ican venture drilled 103 holes last year and, by June, over 230 holes had been completed. The main mineralized zone is between 600 and 800 feet wide, is 50 to 150 feet thick, and 1800 feet long. Drilling has outlined reserves of about 18 million tons averaging 0.035 to 0.045 ounces gold. The ore body will require virtually no stripping and is a good candidate for a heap-leach operation. The deposit is an epithermal hot springs type hosted by the Payette Formation. The two companies merged in October and are now known as *Ican Minerals*. A new zone, called the K-zone, was discovered late in the year. The new discover is about 1,200 feet long with grades comparable to the main zone.

There were several mines with reported activity in the state about which we have very little information. These are small operations that are believed to be in an exploration or development phase. These include:

Company/mine County

*Canyon Silver lease* Shoshone

*Rescue mine J.V.* Idaho

*Iron Mask Company* (Sandpoint) Bonner

*Silver Butte Mining Company* (Sandpoint) Bonner

*Carlin Brothers Mining* (Eagle) S.Africa #1 Boise

*Princess Blue Ribbon, Solomon Mining Company* Camas

*Big Buffalo Mining Company* Idaho

*Terra Technologies, Custer mine* Custer

Other companies answering our questionnaire and noting only exploration or assessment work include:

Company/mine County

*Mountain King* Custer

*Atlas Mining Company* Shoshone

*Salmon Canyon Copper Company* Lemhi

*Geronimo Mining Inc.* Idaho-placer

*Wizard and Magic Mining* Idaho

## **Oil and Gas**

The Organization of Petroleum Exporting Countries, OPEC, agreed in August to cut production, but there was little belief that members would do so without cheating. Late in the year, Sheik Ahmed Zaki Yamani, the oil minister from Saudi Arabia and a leader of OPEC, was removed from his position by the Saudi royal family. In December, OPEC pledged to regain control of world oil prices, agreeing to a target price of \$18 per barrel. Twelve of the 13 member nations pledged to cut production until the floor price was established. Petroleum prices immediately rose, and were continuing to increase at year's end to near the \$18 target price.

Cheap oil for over a year has been a disaster for the United States' petroleum industry, while consumers have enjoyed cheap gasoline and heating oil prices. The price of West Texas Crude ranged from \$26.00 a barrel in January to \$10.00 in March, closing the year at nearly \$18.00. Essentially, all exploration has been drastically reduced as the companies tried to cut costs and live with cheap prices. Companies laid off thousands of staff, including entire exploration departments. Brand new drill rigs sold for scrap prices. Exxon cut capital spending in 1986 by 20 percent, Chevron by 30 percent, and Phillips Petroleum and Unocal, hurt by greenmail schemes two years ago, cut capital expenditures by 25 percent. Exxon, one of the country's healthiest oil companies, offered one quarter of its work force an opportunity for early retirement and laid off thousands of other employees. Most other oil companies were forced to do the same or take even more drastic measures to stay alive.

The United States is now more dependent than ever on foreign oil and cheaper prices have spurred an increase in consumption. Early this year, the country was importing some 5 million barrels a day, or 30 percent of its needs. Such reliance on foreign sources could prove disastrous in the future.

### **Other Developments**

A controversy arose when *Utility Transformer Service Inc.* proposed in March to build an incinerator to burn PCB's at the Bunker Hill complex near Kellogg. A local citizens' group called the Citizens League United for Tourism and Children's Health (CLUTCH) formed to urge the Shoshone County Commissioners to hold a public hearing about the proposed plant. CLUTCH membership would grow to over 500 people. An estimated one thousand people turned out for an information meeting held by the company at Kellogg in May. The air quality permit for the facility was put on hold until next year by the personal intervention of Governor John V. Evans. The state legislature will probably address the issue of PCB disposal and transport in 1987.

Kellogg continued to fight back against the economic decline that began with the loss of its industrial mentor, the Bunker Hill Company, in 1980. A record turnout of voters in June overwhelmingly approved a bond issue to raise \$8 million to build a gondola connecting Kellogg to the Silverhorn ski area. Private investors pledged an additional \$5.6 million to build the gondola, and the Bunker Limited Partnership said it would give the Silverhorn ski facility to the city if the gondola was built. The cost of building the gondola, which would be the largest in North America (four miles long, rising over 4,000 vertical feet), is estimated at \$12 million. City officials have applied for a \$3 million Economic Development Administration grant to help finance the project. The city has also adopted a Bavarian theme and many businesses in downtown Kellogg are remodeling in line with this theme. It is hoped that tourism will enable the town to survive. The city's plans were featured in an article in the *Wall Street Journal* in July.

In May, the 80-year-old Northern Pacific Railroad station in downtown Wallace was moved some 300 feet to make way for a new route through the town for Interstate 90. The building was

restored by the Idaho Department of Transportation as part of a deal to move the building so the new addition to the interstate could be built. The new part of the Interstate will remove Wallace's distinction as having the only stoplight on the entire cross-country highway. The station will be remodeled and opened as a railroad museum, and will be a nice addition to the city's efforts to attract tourists.

The new \$60-million Coeur d'Alene resort was opened in May. Duane Hagadone, a Coeur d'Alene businessman, purchased the old Lake Shore Hotel and totally rebuilt the facility, adding a high-rise tower and the largest floating boardwalk in the country around the facility's marina. The beautiful building with its copper-clad roof is a great boost for Coeur d'Alene's economy and is one of the finest resort facilities in the country.

A six-part series on the history of the Coeur d'Alene district aired on KPBX, Spokane Public Radio, beginning in February. The series, called "Men, Mining and Money," was produced by Phyllis Silver and included lots of interviews with district old timers, mining experts, and a panel discussion about the labor history of the district. The series was supported in part by the Washington Commission for the Humanities and by the Association for the Humanities in Idaho.

Election year found Idaho with several heated races including former Governor Cecil Andrus' race against Lt. Governor David Leroy for the Governor's chair. Andrus was supposed to run away with the election but it went right down to the wire, with Andrus finally declared the victor by a slim majority. Another supposedly close race was for incumbent Senator Steve Symms' job. He was challenged by Governor John V. Evans. This one went opposite to the Governor's race, with Symms keeping his job handily. A major issue in the state was Right to Work (Referendum #1), a hotly contested issue that brought a lot of out-of-state money and influence to bear to win citizens' votes. The people approved Right to Work, a serious setback to unions in Idaho.

The race is on nationwide for a rich prize, a \$4 billion superconducting super collider. The 60-mile in circumference particle accelerator will be the largest in the world. With an annual operating budget of some \$200 million and hundreds of jobs, it is a rich plum indeed. The reservation of the Idaho National Engineering Laboratory near Idaho Falls on the Snake River Plain is Idaho's hoped-for collider site.

Early in the year the Federal Government announced a plan to sell the Bonneville Power Administration to Washington, Montana, Idaho, and Oregon for almost \$9 billion. The plan fell through later in the year.

A new miner's organization, the *Independent Mining Association*, formed in August at Grangeville. The group will work with the U.S. Forest Service and other state and federal regulators concerning access to federal lands in the Nez Perce National Forest, and on other topics.

The second regular session of the 48th Idaho legislature will be remembered as one of the most controversial in the state's history. A strong conservative element dominated the session. A one-

penny increase in the state sales tax was passed to support maintenance budgets for most state agencies and educational institutions. A number of the conservative legislators either resigned at the end of the session or were voted out in the November election. Legislation passed during the session included amendments to the Environmental Protection and Health Act, amendments to the Hazardous Waste Act, special waste disposal standards for commercial waste disposal facilities, and rules pertaining to hazardous waste transportation. The waste transportation and disposal standards were adopted in response to citizen concerns about the Envirosafe hazardous waste disposal site at Grandview in Owyhee County.

A Texas rockhound perhaps made the buy of the year when he purchased a stone from a plastic bucket at a dealer's booth at the Tucson Gem and Mineral show for \$10. The stone turned out to be a huge star sapphire, reportedly one of the largest ever found. The stone weighs 1,905 carats (12 1/2 ounces). When cut, it will be worth about \$2.5 million, according to the owner. The sapphire supposedly was found in Idaho, but the exact location is unknown.

Last, but not least, for 1986 is the story of the Bruneau snail. The small mollusk, only a few millimeters long, was supposed to be added to the federal Endangered Species list but due to government red tape, this was still pending at year's end. There are only about 15 of the critters living in one small hot spring near Bruneau. There were tens of thousands of the snails in the mid-1960's but their hot-spring home has been drying up over the years, endangering the animals' habitat.

Table 2. Net production and earnings for 1986 in the Coeur d'Alene mining district. Compiled from sworn statements on file with the Shoshone County Assessor.\*

	Tons Extracted	Gross Value	Cost of Extraction	Freight & Treatment	Betterments	Net Profit (Net Loss)
Callahan Mining Corporation (Galena mine-Asarco, lessee)	200,819	\$20,696,913	\$13,640,163	\$1,900,314	\$ 618,162	\$4,458,274
Coeur d'Alene Mines Corporation (Coeur mine-Asarco, lessee)	154,610	\$14,309,452	\$ 8,947,695	\$1,799,873	\$8,970,673	\$3,538,906
Hecla Mining Company (Lucky Friday mine)	82,041	\$ 7,290,671	\$12,563,161		\$ 897,195	(\$6,169,685)
Sunshine Mining Company (Sunshine mine)						
Bunker Limited Partnership (Crescent mine)		\$ 847,346	\$ 1,989,425	\$ 120,502	\$1,291,288	(\$2,553,689)

\*Note on form, Statement of Net Profit on Mines for Tax Purposes: "This statement is not a true statement of 'net income' because major expenses, including income taxes, depreciation, depletion, insurance, etc., are not allowable deductions and have not been deducted in arriving at net profit."

**TABLE 1**  
**CURRENT CONTROL OF U.S. COPPER MINE CAPACITY**  
(as of January 1987)

Company	Mine	Annual Capacity (st Cu)
Phelps Dodge	Morenci (a)	221,000
	Tyrone	145,000
	Chino (b)	95,000
	Ajo (c)	<u>40,000</u>
	<b>Total</b>	<b>501,000</b>
Asarco	Ray	110,000
	Mission	70,000
	SilverBell (d)	25,000
	Troy	20,000
	Idaho Silver Mines	<u>2,500</u>
<b>Total</b>	<b>227,500</b>	
Magma Copper	San Manuel	110,000
	Pinto Valley	<u>95,000</u>
	<b>Total</b>	<b>205,000</b>
Cyprus Minerals	Sierrita	110,000
	Bagdad	<u>85,000</u>
	<b>Total</b>	<b>195,000</b>
Kennecott	Bingham Canyon (e)	185,000
Montana Resources	Butte	72,000
Inspiration	Inspiration (f)	60,000
Copper Range	White Pine	60,000
Mitsubishi	Chino (g)	47,500
Sumitomo	Morenci (h)	39,000
All other	Various	50,000
Indicated maximum effective equipped capacity under favorable market conditions		<b>1,642,000</b>
<p>(a) Net of 15% interest of Sumitomo; (b) Net of 33% interest of Mitsubishi; (c) Presently closed; (d) Pit closed, but some continuing production of precipitate; (e) Capacity planned when modernization program now under way is completed in 1988; (f) Sulphide operations suspended, but production of oxide ores at about half indicated capacity is continuing; (g) 33% share of Chino mine; (h) 15% share of Morenci mine.  Note: Table 1 taken from <u>Engineering and Mining Journal</u>, March, 1987.</p>		

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**Table 3**

**Net Production and Earnings for 1986 in the Coeur d'Alene Mining District:  
Compiled from Sworn Statements on File with the Shoshone County Assessor.\***

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Callahan Mining Corporation Galena mine-Asarco, lessee	200,819	\$20,696,913	\$13,640,163	\$1,900,314	\$618,162	\$4,458,274
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Hecla Mining Company (Lucky Friday mine)	82,041	\$7,290,671	\$12,563,161	N/A	\$897,195	(\$6,169,685)
Sunshine Mining Company (Sunshine mine)	58,167	\$3,336,514	\$9,979,076	N/A	\$354,947	(\$8,488,034)
Bunker Limited Partnership (Crescent mine)	N/A	\$847,346	\$1,989,425	\$120,502	\$1,291,288	(\$2,553,689)

\*Note on form, Statement of Net Profit on Mines for Tax Purposes: "This statement is not a true statement of 'net income' because major expenses, including income taxes, depreciation, depletion, insurance, etc., are not allowable deductions and have not been deducted in arriving at net profit."  
N/A (Not Available).

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Table 2

TABLE 2 -- NONFUEL MINERAL PRODUCTION <sup>1</sup> IN IDAHO, 1984, 1985, 1986 <sup>P</sup>						
MINERAL	1984		1985		1986 <sup>P</sup>	
	Quantity	Value*	Quantity	Value*	Quantity	Value*
Antimony -----short tons	557	W	W	W	W	W
Clays <sup>2</sup> ----thousand short tons	1	W	2	W	2	W
Copper -----metric tons	3,701	\$5,455	3,551	\$5,242	W	W
Gem stones -----	NA	<sup>e</sup> 150	NA	<sup>e</sup> 175	NA	\$305
Gold -----troy ounces	W	W	44,306	14,074	70,440	25,938
Lead -----metric tons	W	W	33,707	14,169	9,951	4,836
Lime -----thousand short tons	87	5,616	93	5,803	89	4,729
Phosphate rock -thousand metric tons	4,722	126,586	3,784	<sup>r</sup> 104,000	2,625	55,000
Sand and Gravel: Construction -thousand short tons	4,725	13,509	<sup>e</sup> 4,000	<sup>e</sup> 11,400	5,708	14,830
Silver -----thousand troy ounces	18,869	153,608	18,828	115,645	11,207	61,301
Stone (crushed)-thousand short tons	<sup>e</sup> 1,800	<sup>e</sup> 7,100	2,019	6,977	<sup>e</sup> 3,700	<sup>e</sup> 12,700
Zinc -----metric tons	W	W	W	W	351	294
Combined value of cement, clays (bentonite, common (1986), fire clay, kaolin), garnet (abrasive), gypsum (1984), molybdenum, perlite, pumice, sand & gravel (industrial), stone (dimension), vanadium and values indicated by symbol W ----	XX	<sup>r</sup> 100,327	XX	<sup>r</sup> 81,181	XX	66,783
Total	XX	<sup>r</sup> 412,351	XX	<sup>r</sup> 358,666	XX	246,716

\* (in thousands)

<sup>e</sup>/Estimated. <sup>r</sup>/Revised. NA/Not Available. W/Witheld to avoid disclosing company proprietary data: value included with "Combined value" figure. XX/Not applicable.

<sup>1</sup>/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

<sup>2</sup>/Excludes certain clays; value included with "Combined value" figure. Data from U.S. Bureau of Mines.

**TABLE 1**  
**CURRENT CONTROL OF U.S. COPPER MINE CAPACITY**  
(as of January 1987)

Company	Mine	Annual Capacity (st Cu)
Phelps Dodge	Morenci (a)	221,000
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