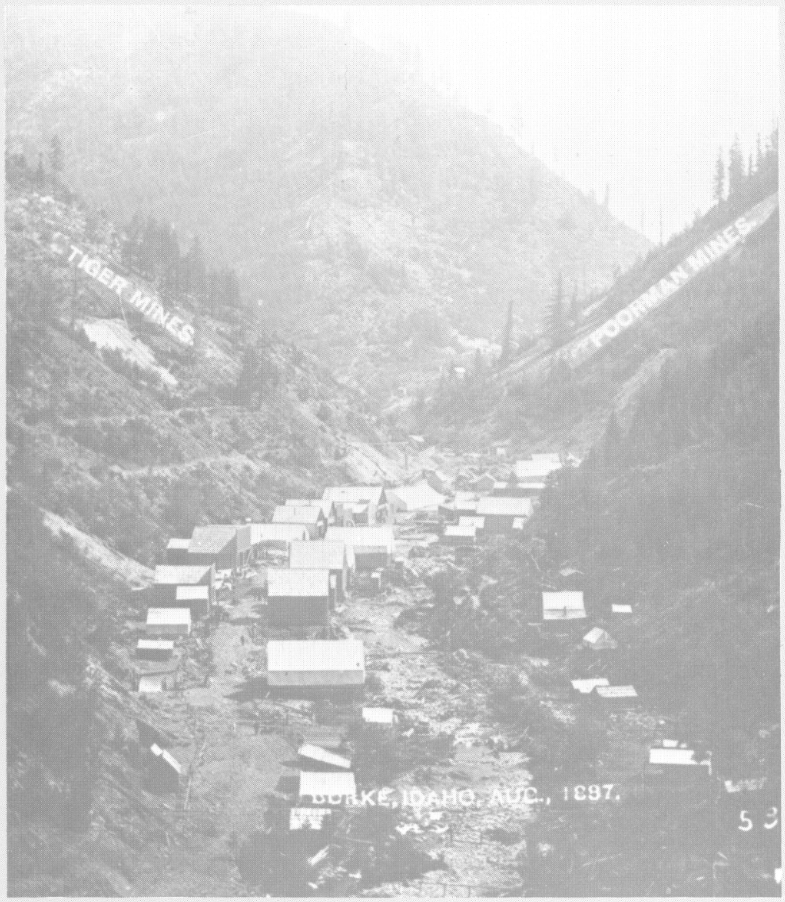
1984

Developments in Minerals, Mining, and Energy in Idaho



Idaho Geological Survey
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Developments in Minerals, Mining, and Energy in Idaho for 1984

by

Earl H. Bennett[1], Maynard M. Miller[1],
William L. Rice[2], Thomas R. Markland[3],
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INTRODUCTION

This report on Idaho's mineral industry and energy resources for 1984 is a cooperative effort among several state and federal agencies and mining companies active in the state. The Idaho Geological Survey acknowledges the contributions of the Idaho Bureau of Minerals, the U.S. Bureau of Mines, the Idaho Oil and Gas Conservation Commission, and the Idaho Mining Association. Numerous individuals in industry, the U.S. Forest Service, and the Bureau of Land Management have also contributed information. Previous annual reports since 1977 are available from the Idaho Geological Survey. The locations of towns and cities referenced in the paper are shown on Figure 1.

MINERAL ECONOMICS

Fears of a collapsing currency, troubled banks, and massive debt forfeitures by foreign governments failed to materialize in 1984. The U.S. economy continued to rebound from the recent recession with strong growth. The Federal Reserve Board held firm on maintaining high interest rates to keep inflation under control. The huge federal deficit hangs over the country like a monstrous thunderhead, but it did not rain on the economic parade in 1984. High

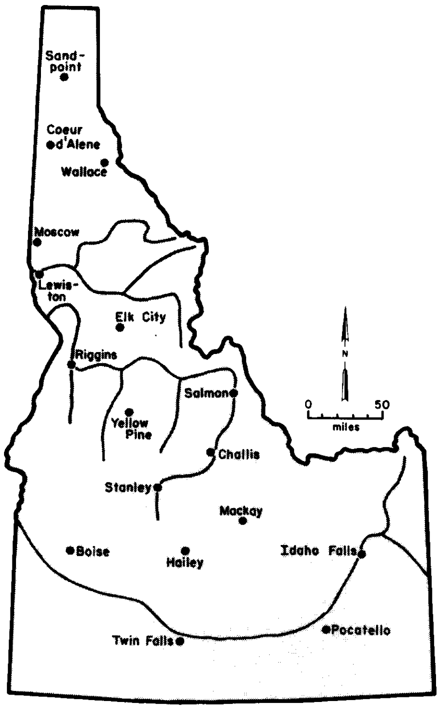

Figure 1. Location of selected cities and towns in Idaho.

interest rates coupled with the strong economic recovery pushed the dollar to recent record highs against foreign currencies. The world oil glut depressed petroleum prices, and precious metal markets collapsed as investors turned to the strong dollar. The dollar's strength hurt domestic producers and manufacturers. With imports increasing and exports declining, trade deficits rose to all-time highs. One consequence of this growing trade imbalance was the loss of jobs in manufacturing throughout the United States.

Merger mania continued during the year. Oil companies gobbled up oil companies: Chevron Inc. took over Gulf Oil Corporation for $13.6 billion; Texaco purchased Getty Oil for $10.1 billion; and Mobil Corporation bought Superior Oil for $5.7 billion (including a $423.7 million stock purchase on June 21, the largest single trade in the history of the New York Stock Exchange). All of these mergers had some effect on mining, because the acquired companies had mining and mineral divisions. For example, Superior's heap-leach gold operation at Stibnite, Idaho, and 47.5 percent ownership of the Delamar mine in Owyhee County are now reportedly for sale by Mobil.

Corporate "raiders" were active during the year. One of the more well known, T. Boone Pickens, chairman of Mesa Petroleum, was once again in the business headlines. Pickens' raid last year on Gulf Oil was phenomenally successful. He and his partners, including Idaho's Sunshine Mining Company, made a bundle on the venture when Gulf was purchased instead by the rescuing "white knight," Chevron. Pickens and another raider, Carl Icahn, brought Phillips Petroleum to its corporate knees in late 1984, leaving the company intact but with over $4.5 billion in new debt. A new term, "greenmail," was coined to describe these raiders' techniques. An equally descriptive term, "junk bonds," describes the financing strategy used by the raiders.

In Idaho, the value of nonfuel mineral production for 1983 and 1984 is shown in Table 1. The historical value of the state's mineral production since 1967 is graphed in Figure 2. Total production increased from $415 million in 1983 to $423.5 million in 1984. Important to understanding this increase is the decrease in the value

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of silver production from $202 million in 1983 to $163 million in 1984, despite increased mining output from 17.7 to 19.8 million ounces. This 20 percent drop in the value of silver production reflects the large decrease in the price of the metal since 1983. The increase in total mineral value for the state is mostly due to phosphate production, which had a much improved year, and to the giant Thompson Creek molybdenum mine that came on-line early in 1984. Idaho produces about 10-15 percent of the nation's phosphate and about 40-50 percent of its silver. Other industrial rocks and minerals also contributed to the increase in net value. Most industrial rock and mineral producers had a good year. Inquiries about the availability of these nonmetallic commodities in the state have increased dramatically at the IGS office, almost equaling the requests about precious metals. Nationwide, Idaho ranked 21 in nonfuel production, down from 17th in 1983.

Silver had a disastrous year. The main culprit for precious metals was the "super dollar," which maintained its strength abroad in spite of numerous predictions that it was overvalued and would decline at any time. Investors and speculators flocked to the dollar, attracted by the high interest rates related to the tremendous federal deficit. The declining inflation rate in the U.S. and the lower world oil prices were other negative factors for silver investors.

Silver started the year under $8 an ounce and rose to $10 in early March. In July, the dollar continued to gain strength, and silver fell to below $7 per ounce. It slipped to $6.26 in December, in part because OPEC's base price for oil obviously was not going to hold, a negative sign for precious metals.

Primary uses of silver are in photographic supplies and in electronics. The *Engineering and Mining Journal* (March 1985) noted that U.S. consumption of silver declined from 157 million ounces in 1979 to 120 million ounces in 1983. Exchange stocks in 1984 totaled around 130 million ounces. In addition, the federal government has stockpiled about 130 million ounces, and the Hunt brothers have about 60 million ounces in Delaware. Estimates of private silver stock in coins, bullion, and silverware are 2.4 billion ounces in the U.S. alone. There is a lot of silver available to the market, many times more than the annual industrial consumption of the metal.

The speculative market for silver continues to guide the price. Trading of silver options started during the year, providing another leveraged investment instrument in addition to the commodity exchanges. The market is apparently still trying to find the fair value for the metal after the Hunt brothers' speculation in 1979-1980 artificially inflated prices briefly to $50 an ounce. It will be most interesting to see how the metal reacts over the next few years to world events and the economy.

Gold had a lackluster year starting at $383 an ounce in January and ending at $309 an ounce. The factors depressing silver also affected gold. Many experts pointed out that the value of gold is near all-time highs in other currencies and is mainly depressed against the dollar.

Lead had an improved market but changed little in price, starting the year at 18 cents a pound and finishing in the same range having risen to 22 cents in midyear. An upturn in the auto industry and related increases in the use of lead for storage batteries were the reasons for the added production. The second major use of lead is as an additive in gasoline, but this use continues to decline as the Environmental Protection Agency (EPA) phases out leaded gasoline.

Zinc began the year at 51 cents a pound, but hopes that prices would continue to improve were short lived. The metal closed out the year at 45 cents. Primary uses of zinc are in galvanizing and in coins (the federal mint is a major market). Several unsuccessful attempts were made to do away with the minimal tariffs on zinc imports, and it is expected that other attempts will be made in 1985. If successful, the domestic zinc industry will be depressed even further.

The U.S. copper industry continued to decline in 1984 in spite of more stable markets worldwide, especially in the U.S. and Japan where economic recoveries were strongest. The price averaged 68 cents a pound for the year, ranging from 78 cents early in the year to a low of 61 cents at year's end. Asarco permanently closed its smelter at Tacoma, Washington, that had

Table 1. Nonfuel Mineral Production in Idaho[1].

Mineral	1983 Quantity	1983 Value (thousands)	1984 Quantity	1984 Value (thousands)
Antimony ore and concentrate, antimony content....short tons....	585	W	557	W
Clays....thousand short tons....	6	$91	[2]1	$243
Copper (recoverable content of ores, etc.)....metric tons....	3,556	6,000	3,701	5,455
Gem stones....	NA	100	NA	150
Lime....thousand short tons....	85	7,686	87	5,616
Phosphate rock....thousand metric tons....	W	W	4,722	126,586
Sand and gravel (construction)....thousand short tons....	e3,000	e9,800	4,725	13,509
Silver (recoverable content of ores, etc.)....thousand troy ounces....	17,684	202,308	18,869	153,608
Stone (crushed)....thousand short tons....	1,935	7,480	1,800	7,100
Combined value of cement, garnet (abrasives), gold, gypsum, lead, molybdenum (1984), perlite, pumice, sand and gravel (industrial), stone (dimension), tungsten ore and concentrate (1983), vanadium, zinc, and values indicated by symbol W....	XX	181,694	XX	100,028
Total....	XX	415,159	XX	412,295

Source: U.S. Bureau of Mines
eEstimated. NANot available. WWithheld to avoid disclosing company proprietary data; value included in "Combined value" figure. XXNot applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Excludes bentonite and fire clay.

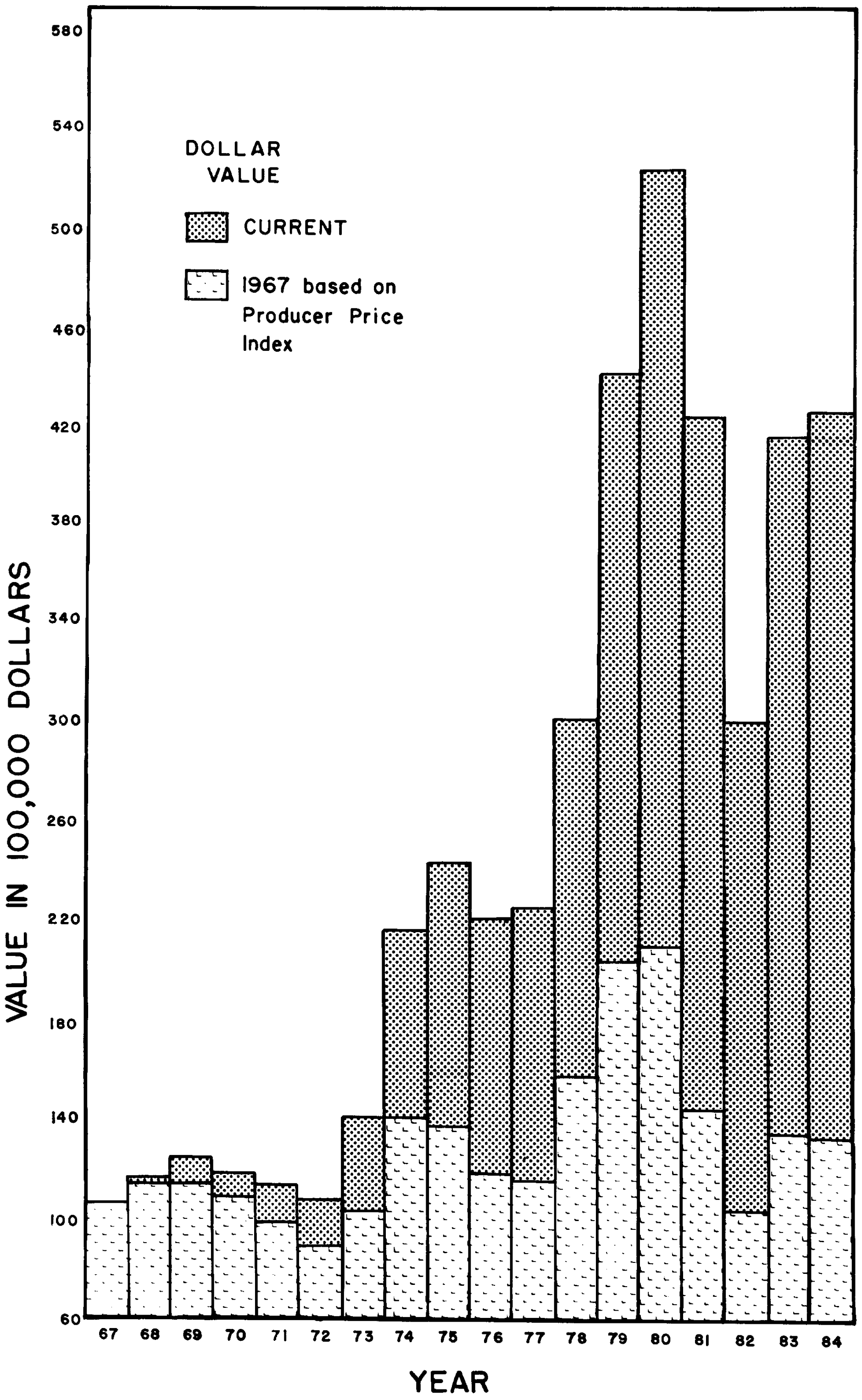

Figure 2. Value of mineral production in Idaho, 1967-1984.

processed ores from the Coeur d'Alene district since the late 1800s. *Engineering and Mining Journal* (March 1985) noted that since 1968 Asarco has invested more than $100 million in attempts to comply with environmental regulations at the plant. The smelter was unique in that it handled complex copper ores containing arsenic and other problem by-products.

Early in the year the domestic copper producers filed for relief before the International Trade Commission. In September, President Reagan decided not to impose import restrictions. A similar petition by the steel industry was also rejected.

The role of big oil in the mining industry is well known, but in 1984 several of the oil giants were looking skeptically at their mining affiliates. An excellent review of the relationship between oil companies and mining companies was presented by Simon Strauss in the March 1985 issue of *Engineering and Mining Journal.* The discussion is quoted below.

Oil industry and copper. Notable during the year were strong indications that the oil industry's long involvement with copper was being subjected to skeptical review among petroleum executives. The romance with copper dates back to the 1950s, when the first incursion by a major oil company into copper took place. This was the purchase by Cities Service of the Miami and Tennessee properties from the Lewisohn interests. Subsequently, Pennzoil entered the industry through Duval Corporation, developing the Esperanza, Mineral Park, Copper Canyon and Sierrita mines. Still later Atlantic Richfield absorbed Anaconda, which had mines in Montana, Utah, and Arizona; Louisiana Land acquired Copper Range; and Standard of Indiana, through Amoco Minerals, bought Cyprus Mines. The culmination was the take-over of the largest copper producer in the US, Kennecott Copper, by Standard Oil of Ohio.

With that deal, more than half the US copper mine capacity was controlled by large oil companies. In addition, other oil companies were busy in copper exploration. Exxon bought Disputada, a medium-sized Chilean producer, and put extensive teams of geologists in the field all over the world. Continental Oil, Gulf, and Getty were actively seeking copper deposits—in the case of the last-named the Escondida discovery, already referred to [earlier in this article] was the result.

But the romance has faded. Two recessions and years of red ink have caused disenchantment. Occidental Petroleum, which had swallowed Cities Service, was the first to pull out. The Miami properties were sold to Newmont. Louisiana Land sold its Copper Range properties to Echo Bay, a Canadian gold miner. During 1984 Pennzoil announced its copper mines were for sale, although no deal has yet been made and the Sierrita mine continues in production. Atlantic Richfield has for years been offering its 50% interest in Anamax under a Federal Trade Commission decree without success. The Utah and Montana properties are believed to be available. Early in 1985 Standard of Indiana announced it would spin off Cyprus in a separate company. Rumors abound about Sohio's plans in regard to Kennecott, but no official statements are forthcoming.

Clearly, the oil industry has discarded its previous perceptions that copper was a business comparable with oil and that superior oil industry management could readily increase copper-industry profits. There is recognition now that major differences exist between the two industries, including particularly the much greater vulnerability of the copper industry to the economy's cyclical swings. Although, as OPEC finds it increasingly difficult to maintain what once seemed an impregnable control over oil prices and oil markets, clearly oil too has its points of vulnerability.

The molybdenum market was flat during 1984 with prices ranging from \$3.75 to \$4.10 a pound throughout the year and falling to \$2.85 in December. According to the *Engineering and Mining Journal* (March 1985), use of the steel additive increased by 18 percent over 1983, but supply continued to outstrip demand. Despite the troubled market, Amoco's Cyprus Thompson Creek mine produced all year.

The world market for phosphate improved greatly in 1984 with a 10 percent increase in production. Shipments of fertilizer in the U.S. increased 24 percent to 35.1 million metric tons in fiscal-1984, but U.S. producers were still hampered by strong competition from overseas suppliers. The U.S. Bureau of Mines reports that the average domestic price for the year decreased 4 percent to \$23.93 per metric ton. Regionally, the value of eastern phosphate decreased while the value of western phosphate increased 7 percent to \$28.40 per metric ton.

MINERAL OPERATIONS

METALLIC MINERALS

Coeur d'Alene Mining District

The large banner across the main street of Wallace, Idaho, proclaimed "Wallace Centennial." This was Idaho's big mining story of 1984. Wallace and the entire Coeur d'Alene mining district celebrated 100 years of lode mining in the Silver Valley. The first lode claims were staked by John Carten and Almeda Seymore at the Tiger mine near Burke on May 2, 1884.

In the 100 years since, miners have wrestled from the district's mines 998.2 million ounces of silver, 8.4 million tons of lead, 3.2 million tons of zinc, 169,762 tons of copper, and 507,297 ounces of gold worth together over \$4.6 billion. Production has come from about thirty major mines and an equal number of minor ones. In 1985, the district will exceed one-billion ounces of silver production, and then it can lay claim to being the largest silver-producing district in the world. Estimates of production from the other leading silver mining areas are Pachuca, Mexico, with 1.2 billion ounces; Guanajuato, Mexico, with 983.6 million ounces; and Potosi, Bolivia (formerly upper Peru), with 964.5 million ounces. All of these districts started mining in the 1500s or earlier, so the production figures are rough estimates. The one-billion ounce figure for the Coeur d'Alene is well documented.

The one-billion ounce silver production while impressive can also be looked at in a more sobering way. According to the economic report of the president, February 1985, the national debt for the United States in 1984 was 1 trillion, 576 billion, 748 million dollars. The yearly interest on this debt in 1984 was 111 billion, 58 million dollars, or 9.3 billion dollars per month. As noted the total historic value of all of the ore mined in the Coeur d'Alene district over the last 100 years is 4.6 billion dollars. This amounts to a present-day two-weeks' interest on the national debt.

In 1984, district mines produced 16.9 million ounces of silver, 31,336 tons of lead, 3,304 tons of zinc, 3,966 tons of copper, and 3,763 ounces of gold for a net value of \$163.9 million. The decrease from the 1983 total of \$206.6 million reflects the lower silver prices. These production figures are supplied by Don Springer of Osburn, Idaho.

The production and cost figures for the district's mines as recorded with the Shoshone County assessor's office are shown in Table 2. Net profits decreased from \$82 million in 1983 to \$36 million in 1984. A major change was Sunshine Mining Company from a profit of \$30 million last year to an \$11 million loss in 1984.

The district's mines continued to produce approximately 50 percent of the nation's newly mined silver. The Sunshine mine ranked first in silver production in the nation followed by the Lucky Friday. Asarco's Troy mine in Montana ranked third and was followed by the Galena and the Coeur mines. The location of active mines in the district are shown in Figure 3.

The *Sunshine Mining Company* celebrated its 100th anniversary in 1984. The original claims on the Yankee lode above Big Creek were filed by True and Dennis Blake, two farmers from Maine, on September 25, 1884. Since then, over 300 million ounces of silver has been mined from the Sunshine mine, one of the richest silver mines in the world.

In 1984, the Sunshine mine produced 4,808,072 ounces of silver, 1,707,129 pounds of copper and 1,303,112 pounds of antimony from 248,568 tons of ore. Ore grade averaged 19.91 ounces of silver per ton. Development work concentrated in the No. 12 shaft area of the mine. Stations at the 4600 and 4400 levels were completed, and an ore transfer system was established between the 4200 and 5000 levels. Work continued on developing the Copper and Syndicate veins and the Rambo area. A revamping of the mine ventilation system increased fresh air flow by 25 percent. Mining costs were decreased by 6 percent due to improved mining techniques and better labor relations. There were 296 men employed at the mine and another 24 at the 1,000 ton-per-day mill.

The centennial year started well for the company. Work continued on finishing the \$17 million silver refinery that will have an annual output of 8 million ounces. It is hoped that the plant will be in operation prior to the mid-1985 shutdown of the Tacoma smelter where Sunshine currently ships its concentrates from the Sunshine mine. The Tacoma smelter, plagued with environmental problems, is owned by Asarco.

One of the district's major stories for the year was the Sunshine-Hecla corporate shootout for control of Ranchers Exploration and Development Company of Albuquerque, New Mexico. Ranchers owned the highly profitable Escalante silver mine. In early March, Sunshine offered Ranchers' management a stock swap valued at \$222 million for the company. On March 8, Hecla announced a merger agreement with Ranchers valued at \$201 million. The final Sunshine offer was 2.5 shares of stock for each share of Ranchers whereas Hecla offered 1.55 shares for each Ranchers' share. Hecla had the upper hand as its

Table 2. Net production and earnings in 1984 in the Coeur d'Alene mining district, compiled from sworn statements on file with the Shoshone County Assessor.*

Company	Tons Extracted	Gross Value	Cost of Extraction	Freight & Treatment	Betterments	Net Profit (Net Loss)
Callahan Mining Corporation (Galena mine—Asarco, lessee)	209,000	$31,059,955	$13,651,152	$ 2,115,982	$ 773,266	$14,519,555
Coeur d'Alene Mines Corporation (Coeur mine—Asarco, lessee)	144,253	$20,650,401	$ 8,367,836	$ 1,926,851	$ 80,271	$10,275,443
Hecla Mining Company (Lucky Friday mine)	257,315	$44,218,657	$25,631,018	$ 5,762,655	$ 2,292,850	$10,532,133
Sunshine Unit (33.25% share)	4,718	$ 3,243,807	$ 3,399,717	$36,327,131		($155,910)
Consolidated Silver mine	0	$ 0	$ 3,356,327	$ 0		($3,356,327)
Sunshine Mining Company (Sunshine mine)	223,304	$32,033,112	$30,107,796	$ 2,131,565	$11,622,306	($11,828,555)
Bunker Limited Partnership (Crescent mine)		$ 4,467,330	$ 3,319,402	$ 616,374	$ 2,933,011	($2,221,457)

*Note on the 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."

offer had the approval of Ranchers' directors. Then early in April, in a move to bypass Ranchers' management, Sunshine threatened to go directly to Ranchers' shareholders with its offer. By mid-April Hecla had firm commitments for about 35 percent of Ranchers' shares; Sunshine controlled 7.7 percent. Hecla and Ranchers sued Sunshine arguing that Sunshine had commenced its exchange offer in violation of federal securities law. The suit claimed that Sunshine had stated in a prospectus that the stock exchange would be tax free whereas the exchange was in fact taxable.

On April 24, Sunshine and Hecla reached an agreement. Sunshine would purchase its 7.7 percent of Ranchers' shares and vote them in favor of the Hecla merger. Sunshine would then swap the shares for Hecla stock giving Sunshine 777,224 shares or 2.8 percent of Hecla's outstanding shares. In addition, each company agreed not to acquire any more of the other's stock for 10 years. Other points of the agreement consolidated each company's position in the district.

Sunshine gained full control of the Unit area of the Sunshine mine. The Unit area was owned 33.25 percent by Hecla. About 75 percent of the production from the mine comes from the Unit area. This agreement increases Sunshine's share of silver production from the mine by more than 20 percent and expands the company's reserves in the mine by 25 percent. Hecla transferred its 54.2 percent interest in the

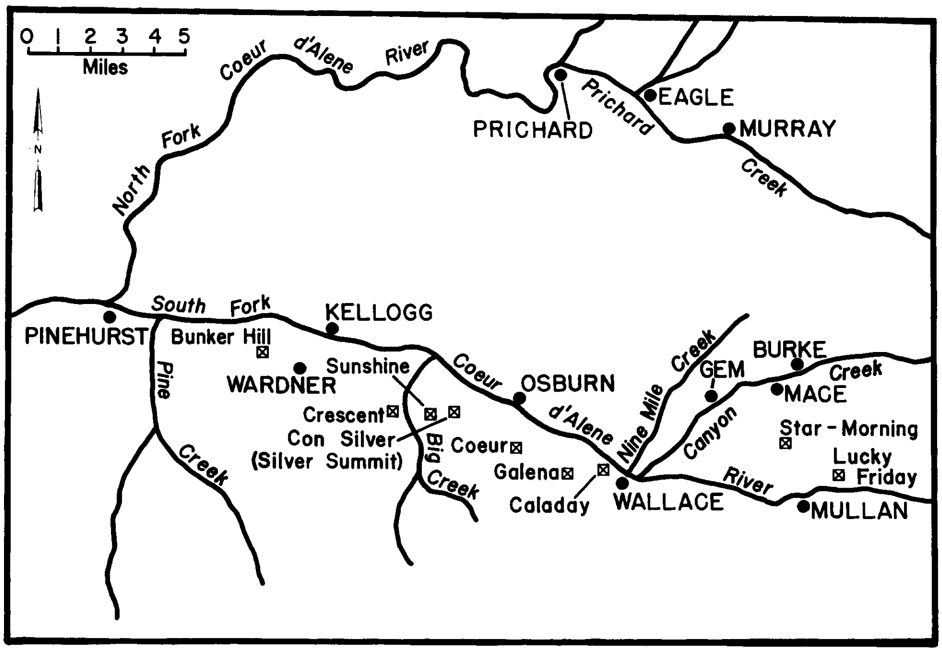

Figure 3. Location of mines in the Coeur d'Alene District.

Chester Mining Company to Sunshine. Both companies agreed to drop the Syndicate litigation in the X area of the Sunshine mine. Hecla gained Sunshine's 18 percent interest in Consolidated Silver Corporation, operator of the Consolidated Silver project, and also received 2.25 million shares of Sunshine stock. Sunshine transferred its interest in the Allied Silver property under Mullan to Hecla.

Although giving up the Allied Silver property as part of the agreement, Sunshine continued drilling at the nearby Gold Creek property. A vein discovered 10 years ago by Bueno Coeur d'Alene is the target. The 600-acre property has been under an exploration agreement with Sunshine for the past three years. The hole to intersect the vein was 2,700 feet deep in November.

A summary judgment in May upheld Metropolitan Mines Corporation's claim to part of the Copper vein that lies within Metropolitan's claim lines. Sunshine is expected to appeal the decision.

The Yankee Girl vein was mined throughout the year. A settlement between Sunshine and Silver Surprise in 1983 had paved the way for the venture. About 700 tons of ore a month was mined, averaging 18.5 ounces of silver per ton. All of the known reserves are above the 3700 level of the vein, and little exploration work has been done below this level. Silver Surprise holds a 50 percent interest in all reserves.

Sunshine announced in April that it planned to move its operational headquarters from the mine site at Big Creek to Boise. The move was completed during the summer, and thirty people were either transferred or hired for the new office.

Much of the silver mined by the company during the year was held off the market owing to the poor price. Silver from the 16 to 1 mine in Nevada was stockpiled. Concentrates were shipped from the Sunshine mine, but the company hedged these shipments with forward positions on the futures market, in effect negating the shipments. By year's end, 3.2 million ounces were in futures contracts expiring at various dates through November 1985.

The direct sale of silver to the public that was started in 1983 proved very successful. Sales and marketing are handled by the company's subsidiary, the Sunshine Bullion Company. With the lowest markup in the industry, direct sales by phone or mail were big business in 1984. Over 3 million ounces were sold directly to individual investors during the year. The company's metals commodity business in England, Sunshine Mining of London Ltd., reorganized and consolidated its staff and leadership.

Early in the year Sunshine deviated from its primary interest in silver to join Mesa Petroleum's chairman, T. Boone Pickens, and other investors in a massive purchase of Gulf Oil stock. Sunshine purchased 1.4 million shares. In June, Gulf was taken over by the Standard Oil Company of California in the largest merger in U.S. history valued at $13.4 billion. Sunshine made approximately $43 million on this deal in about four months' time. Considering that the entire corporate profit for Sunshine in 1983 was $5.4 million, the Gulf deal was extremely rewarding for the company. The bonanza offset losses in mining operations of $12.1 million for the first three quarters of the year. The company's cash position was very strong after the Gulf investment with about $80 million available to sustain mining operations and to make new acquisitions.

Sunshine diversified in September and formed a subsidiary, the Sunshine Oil and Gas Company. The new company acquired the First Matagorda Corporation, an oil and gas business on the Gulf Coast in Louisiana and Texas. The acquisition was a stock swap worth about $28 million. In October, Sunshine announced plans to acquire Kansas-based Texas Energies Inc., which has producing oil wells in the Midwest, in a stock swap valued at $14.5 million. The company is looking at other potential acquisitions in the natural resource area, according to a company spokesman.

Sunshine continued a development agreement with Stephens Inc. to develop and mine the Bellevue placer project in Plumas and Sierra counties in California. The properties are leased from the Soper-Wheeler company of Strawberry Valley, California. Sunshine has been exploring the property for three years and may mine the placer operation using underground methods.

The company's 16 to 1 mine in Nevada produced 837,463 ounces of silver and 5,984 ounces of gold from 200,895 tons of ore. Concentrates are shipped to the refinery in Idaho. Development continued at the Trixie mine near Eureka in the East Tintic district, Utah. Development work continued at the nearby Burgin mine also. Some ore was shipped from both properties as a result of the development efforts.

The company's Centennial celebration kicked off in June with a press conference at which the first of 5,000 centennial silver medallions was presented to Jeannie Steinman, the designer of the medallion. A centennial poster designed for Sunshine by wildlife artist Morten E. Solberg, featuring an eagle, was unveiled. A special ten-page supplement to Sunshine's newspaper, *The Drifter*, was prepared on the history of the company. In September, a play entitled *The First 100 Years* was presented at Kellogg. Later, 350 people attended a reception at Kellogg High School. The company distributed 60,000 Eisenhower silver dollars to its employees as part of their paychecks in September. Each employee received 100 of the dollars. Sunshine planned this intensive circulation of silver dollars to be an effective reminder of what the industry means to the communities in the Silver Valley.

In May 1983, *Hecla Mining Company* was approached by the First Mississippi Corporation to discuss Hecla's acquisition of First Mississippi's 21.5 percent of the outstanding shares of Ranchers Exploration and Development Company. These discussions ended when Ranchers' flamboyant chairman, Maxie L. Anderson, was killed in a ballooning accident. In September 1983, Sunshine Mining Company approached Ranchers about a possible merger. This offer was rejected by Ranchers' management in November.

An outline of the subsequent merger strategy pursued by Sunshine and Hecla is noted under the Sunshine Mining Company report. On April 24, 1984, Hecla and Sunshine came to an agreement that paved the way for Hecla's acquisition of Ranchers on July 26, 1984. Each share of Ranchers was exchanged for 1.55 shares of Hecla stock. The mutally advantageous agreement between Sunshine and Hecla settled a host of property disputes and consolidated holdings of both companies in the district. Hecla stockholders ratified the merger in late July. The merger was valued at $200 million.

Ranchers had a reputation for being an aggressive company and creative in fiscal matters. For example, the development of the Escalante silver mine was financed by borrowing silver at a low interest rate and then selling the silver for cash. The cash was then used to finance the mining project. The low interest on the borrowed silver was a substantial saving over the prime interest rate for cash. The borrowed silver was guaranteed by future production from the mine. The company also hedged production on the commodities market to offset inflation and market fluctuations. Ranchers was perhaps best known for paying dividends in silver, if so desired by the stockholder.

The Ranchers merger was the second important acquisition for Hecla following the buy-out of Day Mines Inc. in 1981. As the surviving company, Hecla will be the premier silver mining company in the United States.

The main asset of Ranchers was the Escalante silver mine in Utah, which produced 2,235,781 million ounces of silver for Hecla in 1984 from 286,554 tons of ore and was one of the lowest-cost mines to operate in the U.S.

Ranchers also owned the Kentucky-Tennessee Clay Company, which mines and sells clay for ceramic products, refractories, and abrasives, and the Colorado Aggregate Company, which markets volcanic rock (scoria) for landscaping and briquets for gas barbecue grills. These industrial rock and mineral companies were an important acquisition for diversifying Hecla's business, and they accounted for 20 percent of 1984 sales and 21.7 percent of operating income.

Ranchers also owned other operations: the Bluebird copper mine in Arizona that was placed on standby in 1982, several uranium properties in New Mexico, and the Golden Eagle mine in Alaska that had poor results in 1984 and is for sale.

Hecla offered the president and chief executive officer of Ranchers, Leland O. Erdahl, a senior vice presidency in the company. Seven of Ranchers' executives including Erdahl decided not to join the Hecla organization, although Erdahl did accept a position as a member of Hecla's board of directors. Differences in management style and a reluctance to leave Albuquerque were cited for the decisions.

The Ranchers' merger had little impact on the Silver Valley in comparison with the announcement in August that Hecla was moving its own corporate headquarters from Wallace to Coeur d'Alene. This planned relocation followed similar corporate moves by Coeur d'Alene Mines Corporation (also to Coeur d'Alene) and Sunshine Mining Company (to Boise). The need for more office space as a result of the merger, the ability to attract and retain professional employees, and closer transportation facilities were given as reasons for the move. In addition, Ranchers' Albuquerque office will be closed by year's end, and it is expected that about thirty Ranchers' employees will move to Coeur d'Alene and Wallace. The new headquarters will be on a 132-acre site along U.S. 95 north of Coeur d'Alene. About sixty Hecla employees will be relocated. Hecla will buy the employees' homes in the Silver Valley to facilitate the move.

Many citizens in Wallace were upset by the announcement. The *North Idaho Press* printed pages of letters and editorials protesting the move. The company's chief executive officer, William Griffith, came under fire and was labeled as "Griffith the Barbarian" in a *Press* editorial. Hecla refused to talk to the *Press*, and the subsequent news blackout by Hecla against the *Press* made national news. In an 11th hour effort to block the move, five local stockholders tried to get an injunction against the Ranchers' merger claiming that the stockholders would not have supported the merger if they had known about the move. The move had not been mentioned in the prospectus concerning the merger. A U.S. District Court judge in Boise denied the stockholders' request. About 200 people silently protested at the stockholders' meeting held at Wallace in July to approve the merger. The Shoshone County commissioners also asked the company to reconsider and remain in Wallace.

The Lucky Friday mine, flagship of the company, continued full production during the year. The mine produced 4,795,758 ounces of silver, 31,336 tons of lead, 3,304 tons of zinc, 442 tons of copper, and 2,740 ounces of gold from 257,315 tons of ore. This was a slight decrease from the record 5,077,182 ounces of silver mined in 1983. Reserves at the mine are 627,500 tons averaging 17.5 ounces of silver, 13.2 percent lead, and 1.6 percent zinc. There are 298 employees at work in the mine and 15 more at the 1,000 ton-per-day mill.

In March, the United Steelworkers of America, representing the miners at the Lucky Friday mine, started negotiations for a three-year contract with Hecla. The new contract was ratified by a vote of 140 to 93 in early April. As with most labor contracts, many of the particulars of the agreement were controversial. Hecla abandoned efforts to get the union to agree to an open shop and to reduce cost of living adjustments. The company did gain new flexibility in scheduling work assignments and also did eliminate controversial points in the minimum wage paid to "gypo" or contract miners.

The prospectus about the merger and the company's annual report detailed the employment agreements given to Hecla's executive staff. These agreements called "Silver Parachutes" were a topic of controversy in regional newspapers. The agreements guarantee salary and benefits for top executives for three years after a takeover and are similar to those of many other corporations.

Not all of Hecla's press was unfavorable. A feature newspaper article assessing the corporation, the Ranchers merger, the relocation plans, and other recent successes appeared on the front page of the *Wall Street Journal* on October 10.

A lease on the Atlas Mining Company property south of the Lucky Friday was dropped. The Atlas mine was explored over the past two years. Work included a 2,918-foot long drift and diamond drilling to evaluate extensions of the Boulder Creek vein system. Over $1.3 million was expended on the project.

In June, Hecla signed a joint venture agreement with AMAX Explorations Inc. to explore for minerals in the Baker mining district, Judith Basin and Cascade Counties, Montana. The venture, known as the Hughsville project, will concentrate on the Queen of the Hills vein.

Hecla announced last year that closure of the Knob Hill gold mine near Republic, Washington, would occur this summer. Fortunately for all concerned, the announcement was premature. Underground exploration discovered new gold-silver mineralization at two sites in the so-called Bailey structure. Both sites are accessible from the 11th level of the Knob Hill mine, where a crosscut was under way to evaluate the discoveries. The mine and mill employ 85 to 90 people. The new discovery may extend the life of the mine for at least two years. In 1984, the mine produced 22,757 ounces of gold and 80,967 ounces of silver from 61,440 tons of ore.

All exploration stopped in June at the Cripple Creek and Victor Gold Mining Company's properties in Colorado. The program was a joint venture with Texasgulf Inc. and Golden Cycle Gold Company. Hecla assumed management of the properties in 1983. Exploration of the property was unfavorable.

Low metal prices forced the closure in August of the Sherman mine in Leadville, Colorado. The mine was returned to the Leadville Corporation, ending Hecla's involvement with the property inherited in the Day Mines Inc. merger.

A three-year exploration program started from the 5100 level of the Silver shaft at the Lucky Friday mine in March. The primary target is the Allied Silver property under the town of Mullan. Hecla obtained Sunshine's option on the Allied property as part of the Sunshine-Hecla agreement. The company is looking for an extension of the Lucky Friday vein or for new veins parallel to the Friday. Hecla signed an agreement with Allied in November covering the approximately 393 acre area. By year's end, a crosscut had been driven 1,020 feet southwest from the shaft. Two diamond drill holes were drilled southward from the crosscut, and one penetrated the Osburn fault. A lateral was driven 1,120 feet northwest from the crosscut. No significant mineralization was found, but primary targets will not be reached until next year.

Hecla signed an agreement with Nerco to explore property in the Fairbanks area of Alaska. Hecla will be the operator. Nerco is a mining subsidiary of Portland-based Pacificorp, formerly the Pacific Power and Light Company.

The Star mine was back in operation late in the year. James Striker signed a five-year lease on the mine and mill in August and started rehabilitating the property. The company is called the Star-Morning Mining Company and will employ about 20 people. Over 100 applications were submitted for the few positions. Striker operated a lease above the 1700 level of the mine from 1961 until it closed in 1982.

Hecla continued to enjoy its 12½ percent interest in the Galena mine and 5 percent interest in the Coeur mine; both operated normally during the year by Asarco. The company also has a 12 percent ownership in the Caladay project and owns the adjoining Hornsilver-Peerless claims that will be explored by Callahan. Other interests of the company include the Oriental mine, a gold property in Sierra County, California; the Revenue Virginius property near Ouray, Colorado; the Lisbon Valley uranium-vanadium mine near Moab, Utah (owned by Hecla and Union Carbide); and a 35 percent ownership of common stock in Granduc Mines Ltd.

Hecla earned $12,092,000 or 45 cents a share for the year. This is a decrease from the $37.6 million earned the previous year. The reduced earnings were the result of much lower silver prices, the costs in the Ranchers merger, and exploration expenses. The company was one of the few in the mining industry to make a profit in 1984.

A vein with potential for becoming an important orebody was found on August 8 in the *Consolidated Silver Project.* The project, a $17 million exploration venture near Osburn, is operated by Hecla on 93 patented and 24 unpatented claims that include the Silver Summit mine. The Consolidated Silver Corporation is a group of companies that pooled their holdings in the area in 1967. Hecla, Coeur d'Alene Mines, and Sunshine contracted with the corporation to explore and develop the property in 1980. Sunshine transferred its interest in the project to Hecla as part of the Ranchers' agreement. Coeur d'Alene Mines increased its interest to 17.1 percent in 1984 leaving Hecla with the rest.

The new discovery was made 1,700 feet south of the Silver Summit shaft that was deepened from 3,000 to 5,626 feet during an earlier phase of the project completed last year. The new find is believed to be the downward extension of the Silver Summit No. 4 vein that was mined on the 4000 level. Assays on the vein run 19 ounces of silver per ton for 70 feet over a 4.5 foot width and 34 ounces per ton for 50 feet over a 4 foot width. The vein was only a few inches wide when discovered but widened as miners drifted on the structure. A 934-foot drift following the structure was completed at year's end. Two ore shoots were discovered in this drift. Evaluation of the vein will continue next year.

The vein is headed toward ground owned by Metropolitan Mines Corporation. Metropolitan was not consulted in the Sunshine-Hecla agreement although Sunshine transferred some of its rights under an operating agreement with Metropolitan to Hecla. Metropolitan refused to meet with Hecla officials to discuss plans to explore or mine in Metropolitan ground.

In other business, Hecla spent $8,000 on developing the Snowshoe Mining Company claims near Mullan under an exploration agreement.

In January, *Asarco Inc.* signed a new three-year labor agreement with the United Steelworkers' Union, which represents 300 Asarco employees in the Galena mine and Morning shops. The major change over the previous contract was in cost of living increases. The new contract extends labor harmony at the mine to over 19 years. This is a tribute to the miners and to Asarco as labor problems are well known in the Silver Valley.

Asarco operates the Galena mine owned by Callahan Mining Corporation. During the year, the Galena shaft was deepened 169 feet to 5,470 feet; the 5200 level station was enlarged, and drifts started east and west on that level. The 750 ton-per-day mill and the speed control and braking mechanism on the main hoist were renovated to enable deeper mining. The Galena produced 4,194,000 million ounces of silver, 1,400 tons of copper, and 714 ounces of gold from 209,000 tons of ore in 1984. This is an increase from the 3.8 million ounces of silver mined in 1983. The mine has reserves of 1,185,000 tons averaging 17.39 ounces of silver. There are 245 men employed at the mine and 12 in the mill.

The company also operates the Coeur mine owned by Coeur d'Alene Mines Corporation. Operations at the Coeur, the lowest cost mine in the district, were normal during the year. The mine is served by a 4,428-foot shaft with operating levels on 300-foot spacings from the 1300 to the 3700 levels. The mine produced 2,485,000 million ounces of silver, 1,200 tons of copper and 308 ounces of gold from 144,000 tons of ore milled. The Coeur has reserves of 1,013,000 tons averaging 22.02 ounces of silver. There are 140 men working at the mine and 10 in the 450 ton-per-day mill.

The long drive from the 3400 level of the Coeur mine into ground owned by American Silver turned southwest to intersect the Wire Silver vein, one of the primary targets of the exploration venture. Drifting was curtailed for part of February and all of March. At year's end, 4,413 feet of tunneling had been completed on the project. About $1.8 million of the $3.5 million budgeted for the American Silver project has been expended. Coeur d'Alene Mines Corporation, Callahan Mining Corporation, and Hecla Mining Company are partners in the venture.

The 5,100-foot-deep shaft at *Callahan Mining Corporation's* Caladay project was just short of 5,000 feet at year's end and will be completed in January 1985. Shaft and pump stations were installed at the 4600 and 4900 levels, and a loading pocket started on the 4900 level. A diamond drill hole from the 4900 level penetrated the Polaris fault. The next phase of the exploration program will be a 3,100-foot-long drift connecting the 4900 level of the Caladay shaft with the 4900 level of the Galena mine. About 2,200 feet of the drift will be on Caladay ground and 900 feet on Galena ground. The drift will be finished in early 1986 and is to be used as a second exit from the Caladay and for an extensive diamond-drilling exploration program. The cost of the drift should fall within the $26.6 million budgeted for the venture. The company spent $3.7 million on the Caladay this year for a total so far of $20.8 million. The shaft will be completed on schedule and under budget by Fausett Mine Services, a division of Fausett International. Fausett Mine Services also is contracted to drive the drift connecting the Galena and Caladay. The Caladay project is owned 82.3 percent by Callahan, 12 percent by Hecla, and 5.7 percent by Asarco.

Callahan received $6,707,115 from its 50 percent interest in the cash flow from the Galena mine and also received 5 percent of the profits from the Coeur mine. The Galena was the main source of company revenue in 1984, but due to low silver prices Callahan's subsidiary, the Flexaust Company, a manufacturer of plastic hoses and piping, generated more net sales than the Galena production. Callahan funds all projects from internal cash flow.

The company completed the 7,216-foot-long decline to the ore zone at the Rope's Gold property near Ishpeming, Michigan. A mill 16 miles from the mine is being renovated to process gold ore. The project should be in production next year at a capital cost of about $20 million. Approximately $7.4 million was expended on the project this year. In other company business Callahan sold its 49.9 percent interest in K.R.M. Petroleum Corporation. The company spent $7.1 million on mineral exploration during 1984.

Callahan's 5 percent interest in the Coeur mine profits yielded revenues of $875,449 to the company during 1984. In addition, depending upon the block of ground being worked, Callahan continues to fund from 5 to 8.33 percent of the $3.5 million American Silver exploration drift from the Coeur 3400 level.

In late 1983 the big news for the *Bunker Limited Partnership* was the reopening of the Crescent mine on Big Creek in November. From October 1983 until February, 2,000 tons of ore was mined from the Crescent. The ore was trucked to a special circuit at the Bunker Hill concentrator. The first 69 tons of concentrate, averaging 900 ounces of silver to the ton, was shipped by rail on February 13. The shipment was then sent to the Metallurgie Hoboken-Overpelt H.S.A. refinery in Brussels, Belgium, which had given the Partnership the best deal for refining the concentrates. A second shipment of 95 tons was sent in April and a third shipment of 110 tons in May. The company averaged about one shipment per month during the year. In December 1983, shaft sinking and development had started in the No. 2 shaft. By August 1984 the shaft was developed to the 4700 level.

The Partnership decided to go public with the Crescent operation and will offer 2 million shares of common stock in a new company called Crescent Silver Mines Inc. The new company was incorporated in July. The price of the stock is projected at about $6 to $7 per share, and the offering should raise $12-14 million for the company. The Partnership will hold a 75.6 percent interest in the new company, representing 6.3 million shares issued to the Partnership for the mine assets. According to a prospectus of the offering, the new company will assume liability for two-$3.5 million notes issued in 1982 by the Partnership for the purchase of the Bunker Hill complex that included the Crescent mine. About $4 million from the offering will be used to pay off one of the notes and interest; $5 million will go into mine development, and the rest will be a working capital.

The Crescent mine employs 72 of the 110 Partnership employees. Four men operate the mill circuit at the Bunker concentrator. The 4300 level was developed during the year by drifting 1,200 feet to the vein. The cost of operating the mine is about $4.97 per ounce of silver compared to $7.16 per ounce in 1980 and $10.70 per ounce in 1981. Ore reserves in the mine are 163,000 tons averaging 28.2 ounces of silver per ton, or 4.6 million ounces total.

Plans for the mine include sinking the No. 2 shaft from 4,700 to 5,260 feet and developing the 4300 and 5100 levels and later the 4500, 4700, and 4900 levels. A service raise will be driven from the 5100 to the 4300 level to facilitate mining efforts from the new levels. Capital expenditures for this work will be between $7.5 and $8 million. An exploration program will search for new reserves in the mine area.

Throughout 1984, the Partnership studied and discussed the feasibility of opening the Bunker Hill mining and metal refining complex, but low metal prices forced the owners to keep the giant complex closed. A decision on the fate of the facility will be made early in 1985. Zinc and lead prices must dramatically improve before the mine can reopen. Maintenance of the complex is costing the Partnership about $450,000 per month, a cash drain that cannot go on indefinitely. The normal ravages of two winters are also deteriorating machinery and buildings in the complex.

Retired employees of the old Bunker Hill Company filed a class action suit in February against the former company claiming that pension benefits had been cut without any explanation or prior notification. The suit was refiled in May in the U.S. District Court in Boise, this time against the Pintlar Corporation, a company formed by Gulf Resources and Chemical Company, the former owner of Bunker Hill. Pintlar is handling legal and other matters related to the old Bunker Hill Company for Gulf. The lawsuit was just one of several filed against Gulf by former employees over issues relating to health, insurance, and pension benefits. Bunker Limited Partnership has some responsibility regarding health and pension benefits and could be adversely affected by the legal actions.

Other major problems with reopening the Bunker Hill complex besides metal prices have to do with present air quality standards and the cleanup of 100 years of mining residuum that contains hazardous substances. In July the federal Environmental Protection Agency (EPA) issued air quality standards that would have to be met if the facility reopened. The Partnership protested, arguing that the standards were unrealistic and would seriously hamper any possibility of reopening the complex. The cost of installing emission controls at the smelter to meet the standards could run as high as $50 million. The Partnership believes that for about $7 million they could remove about 93 percent of harmful emissions but that it would cost an additional $32 million to remove

95 percent. EPA plans call for removal of 98 percent of the emissions. The plant was filtering out about 84 percent when it closed in 1981. The EPA regulations went into effect on December 1, 1984. The company would have up to three years to meet the standards. If the plant was not opened within three years then the company would have to meet the standards before opening. Public hearings on the EPA plan were held on August 5 at the Kellogg High School. The entire Idaho congressional delegation condemned the plan in absentia, and many angry citizens also voiced opposition to the regulations.

The State of Idaho filed a lawsuit against the Pintlar Corporation seeking restitution and restoration for environmental damage done by the Bunker Hill Company operations. Four insurance firms that signed contracts with Bunker Hill in 1974 disowned any responsibility for helping Pintlar. They claimed the contracts did not cover the damage listed in the state's suit.

The EPA budgeted $1.5 million for a 1½ year study of heavy metal contamination in the vicinity of the smelter. The study will be done by the EPA and the Idaho Department of Health and Welfare. Some of the work will be undertaken by the Panhandle Health District office in Silverton. The Kellogg area is the number one target in Idaho scheduled for cleanup using the EPA superfund.

Coeur d'Alene Mines Corporation receives 40 percent of the ores and concentrates from the Coeur mine operated by Asarco. The company also pays 40 percent of operating expenses and capital expenditures related to the mine. The Coeur is the company's main source of revenue. It also has a 17.1 percent interest in the Consolidated Silver Project (increased from 12.1 percent held last year) and a 35 percent share in the American Silver exploration venture in the block being explored. The Thunder Mountain gold project in rugged central Idaho is a major program for the company and is described later.

In May, the company announced plans for moving its executive office to Coeur d'Alene from Wallace. The office will be on the fourth floor of the new First Interstate Plaza at Fifth and Front streets. The four-story building with a view of the lake is under construction and should be completed early in 1985.

Progress was made at the 600-acre Rochester, Nevada, gold-silver property. A feasibility study is under way by Morrison-Knudsen's mining group. The claims were purchased from Asarco in 1983 for $10 million. Coeur d'Alene Mines has a 92 percent interest in the property, and Asarco maintains a royalty interest. More drilling and design work are scheduled for next year.

Coeur d'Alene Mines purchased a 20 percent interest in ISL Ventures Inc. that plans to develop an in-situ leaching and extraction method for gold and silver using cyanide. The method involves extracting ores in solution from drill holes rather than by conventional surface or underground mining techniques. Members in ISL include those that will fund the project—Coeur d'Alene Mines and the Bank of America Capital Corporation—and those who will contribute technology, expertise, and facilities—the San Francisco Mining Association, Roy B. Huff and Associates, and Jerry F. Bergeson and Associates.

In June, shareholders voted to increase the authorized shares of common stock in the company from 10 million to 30 million. The company also unveiled its new "Silver Freedom" one-ounce silver medallion that is available for purchase by stockholders.

In January, the company made a special gift to Idaho. One thousand ounces of silver from the Coeur mine was fashioned into twelve sterling silver candlesticks and presented to the state for use at official functions and in the Governor's mansion. The candlesticks are copies of an 18th century design and were molded by the Metropolitan Museum of Art in New York City.

Coeur Explorations (a wholly-owned subsidiary) continued work at the Capitol Silver project under a modified agreement. The company spent $113,555 on the property in 1983, but reduced this amount in 1984. Over 4,900 feet of new drilling was done on claims held by Royal Apex Silver. An evaluation of this property has been under way for several years and will continue.

Coeur d'Alene Mines was ranked third among 277 companies on *Forbes* magazine's "Up and Comer" list in late 1983.

Other Coeur d'Alene Properties

The year appeared off to a fast start when full page advertisements in the Spokane newspapers announced that one of the biggest silver mines in the U.S., known as the Silver Eagle mine, was nearly ready to begin operations. The mine, supposedly located somewhere in the Coeur d'Alene district, claimed to have ore reserves of 100 million tons running 80 ounces of silver to the ton. The only Silver Eagle mine known in the district was not involved. Over 150 people including several district geologists attended the company's promotional meeting in Spokane to hear about investment opportunities in this purportedly rich mine. At the last moment the meeting was cancelled because the Securities Division of the Washington Department of Licensing had served the promoters, the Gold and Silver Investment Company, with a cease and desist order. Warnings were also sent to the company by the federal Securities and Exchange Commission. Nothing more was heard about the "fabulous" mine.

Pacific Coast Mines, a subsidiary of U.S. Borax, signed exploration agreements with Silver Ramona Mining Company, R and G Mining Company, Silver Development Mining Company, Silver Challis Mining Company, Silver Horizon Mining Company, and Silver Aurora Mining Company. The claims are located east and west of Beaver Creek, south of Prichard. Pacific drilled two holes (1,300 and 1,700 feet deep) on Empire Gold Mines Inc.'s property during the year. The company has had a lease on Empires' claims for 2½ years. Pacific is believed to be looking for stratiform copper/silver ore in the Revett Formation south of Prichard and for stratiform gold near Murray.

The Murray gold rush that started last year continued through 1984. *Cominco America Inc.* continued with its second year of work on the 109 claims of Viking Resources' property near Murray. Other companies with interests in the area include *Exxon Minerals Company* and *Asarco Inc.*

The placer operation at the Golden Chest mine operated during the year. *Intermountain Mining and Engineering* continued exploring the Golden Dream property, five miles northwest of Murray. A drilling program was under way to block out ore for production. *Boto Enterprises Inc.* received the go-ahead to start a placer operation on 28 acres north of Murray.

Goldback Mines Corporation mined gold ore from claims between Wasp and

Gold Run gulches. The ore was milled at the Rex flotation plant near the summit of Dobson Pass. The company also has claims near Mullan that are under option to Anaconda Minerals Company. Nesco Resources Inc. acquired a 30 percent interest in Goldback in February.

Two wildcat drilling ventures in the east end of the district drew a lot of attention during the year. *Teck Resources Inc.* from Vancouver, British Columbia, passed 4,400 feet early in December in a deep hole at the Rock Creek-Gem State property east of Wallace. Drilling had started in July. The hole will go to about 5,000 feet. Anomalous silver-copper values were intersected at 1,800 feet, and the Wallace-St. Regis contact was penetrated at 2,100 feet. The hole will explore the downward extension of the vein to the favorable Revett-St. Regis contact. The vein was explored in 1947 by Hecla. Teck is providing the technical expertise on the project and Preferred Resources Ltd. the financing. The cost of the hole may run as high as $500,000.

Anaconda Minerals Company started drilling a deep hole on Shoshone Silver Mining Company's claims near Stevens Peak. The hole was over 4,500 feet deep in December on its way to 5,000 feet plus. The target is the Champion vein where it intersects the favorable Revett-St. Regis contact. It is hoped that the vein is an extension of the Silver Belt that lies to the west of the drill site. Anaconda has over 25,000 acres under option in this area involving several small mining companies.

Both the Teck and Anaconda drilling projects will be the deepest holes ever drilled in the district. New drilling technology allows the drill to be guided or navigated to its target. Boyle Brothers Drilling is using its patented Navi-Drill rigs to sink both holes. Results from the expensive technique have so far justified the extra cost over more conventional drilling.

Mines Management Inc. leased the 6,100-acre Janstan property on the Idaho-Montana border. Geologic studies last year discovered stratiform copper and silver mineralization. Diamond drilling was planned for 1984 to define the target area.

Wallace Silver Inc. was formed by the same people who put together Allied Silver. The company wants to gain control of all subsurface mineral rights under Wallace. Property owners and the city would own shares in the company. The company currently holds subsurface mineral rights to about 65 percent of Wallace but has had some difficulty in dealing with the city, which owns most of the remaining 35 percent.

Ore shipments continued from the lease at the *Canyon Silver mine* on Canyon Creek. Five hundred tons of ore was shipped to Intermountain Minerals Engineers' custom mill at the Nabob mine on Pine creek. The lessees plan to ship about 500 tons a month. Assays on the Canyon Silver vein run 7.34 ounces of silver to the ton, 6.9 percent zinc, and 14 percent lead. Production is currently from the 600 level of the mine, and the lessees hope to develop the 800 level.

Noranda Exploration Inc. terminated its lease on the Idaho-Montana Silver Inc. property that straddles the Idaho-Montana border. The company's exploration program did not find a deposit large enough for Noranda's requirements.

Callahan Mining Corporation will explore 17 claims near Silverton that are owned by Silverton Mines Inc. The agreement was negotiated by Fausett International Inc.

Other Mining Operations in the State (Figure 4)

Clayton Silver Mines Inc. reopened the Clayton mine in February. The mine was closed by flooding caused by the October 28, 1983, Borah Peak earthquake that rocked the Challis area. Prior to the quake 950 gallons of water per minute flowed from the 1,100-foot main shaft. Since the quake, water flow is two-thirds greater. A new, larger capacity pumping system was installed to handle the increased flow. The new system pumps 2.25 million gallons of water daily from the mine. The water problems cost the company an estimated $800,000 in new equipment and down time. A new underground communication system was also installed.

Mine production for 1984 was 226,417 ounces of silver, 1,397,531 pounds of lead, 148,295 pounds of copper, and 73,576 pounds of zinc from 76,110 tons of ore. About 325 tons of ore a day is mined. The mine employes twenty-eight men and the mill seven. The mine closed out 1984 with a bang, detonating the largest sequential blast ever shot at the mine, as 12 tons of powder was used to break 65,000 tons of rock.

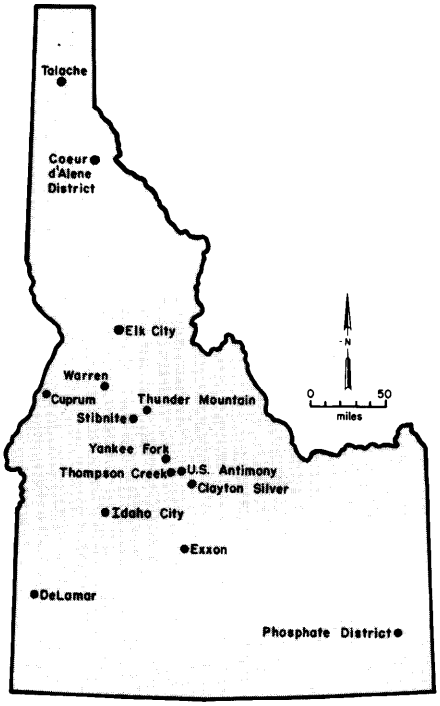

Figure 4. Location of some active mining operations and districts in Idaho.

Production continued throughout the year at the *Cyprus Thompson Creek Molybdenum mine* near the town of Clayton. Three shifts a day operated seven days a week in preproduction stripping and mining for much of the year. The mine is owned and operated by Amoco Minerals Company, a subsidiary of Standard Oil of Indiana. The huge open-pit mine employs 215 people and the 25,000 ton-per-day mill another 130 workers. About 60 percent of the work force is local. The mill produces 50 tons of MoS_2 concentrate per day. During 1984 the mine produced 10.5 million pounds of MoS_2 concentrate.

The Rajneesh Investment Corporation purchased for $5.5 million the 300-unit labor camp that had been set up on Squaw Creek. The camp was used during the construction phase of the mine. The mobile housing units will be shipped to the Rajneeshee commune at Rajneesh (formerly Antelope), Oregon. Amoco also sold several of the 262 homes that were built in Challis. The company overbuilt the development and is selling off units that can be removed from the area.

According to a *USA Today* article, the population of Custer County grew from 3,385 in 1980 to 6,514 in 1984 for a 92 percent increase mostly due to the huge mining operation.

The mine has had an exemplary record for reclamation and environmental awareness. The Idaho Conservation League, generally not considered a friend of the mining industry, praised the company for doing an excellent job of reclamation at the mine site.

Throughout the year an experimental cyanide-leach system was tested to extract low-grade precious and base metals present in the ore. The minor content of precious metals will be offset by the large tonnage of material that the complex processes. Nevertheless, returns from precious metals will probably be minimal.

Coeur d'Alene Mines Corporation made significant progress at its major exploration project at the Sunnyside mine in the Thunder Mountain district of central Idaho. The company acquired a 60 percent lease interest on the property from Phillips Petroleum in 1982. Phillips maintains a 10 percent interest with a two-year option to buy back in for an additional 10 percent. Thunder Mountain Gold Inc. is the owner and will earn 30 percent of net profits from the mine. The open-pit, heap-leach mine is scheduled to go into operation in 1986. About 95 percent of the site preparation work was completed during 1984. The company budgeted $6.7 million for the project's completion. Total cost for the mine should be $10.2 million, well below the $15.3 million original estimate. The Morrison-Knudsen Company's mining group has the design and engineering contract.

The mine will employ about 80 people. Plans call for operating 180 days a year and mining 2,000 tons of ore per day from the open pit. Severe winters in the area limit operations. The main orebody is within approximately 50 feet of the surface on 13 patented claims covering 260 acres. The entire operation will be on 140 acres of patented claims. The company controls 33 patented claims and 449 unpatented claims in the area covering 9,800 acres. The mine has fully diluted ore reserves of 1,777,000 tons and is projected to produce 25,000 ounces of gold per operating season. The Sunnyside mine averages 0.1 ounce of gold per ton, the ore directly leachable using sodium cyanide.

Plans for using 80 acres of adjacent U.S. Forest Service land for a tailings impoundment and waste dumps have been dropped. This removes the company from the federal review process, although a draft Environmental Impact Statement (EIS) was given to the Forest Service when the use of federal land was being considered. The company plans to release the EIS as a public gesture.

The mine and mill site were prepared and bunkhouse and trailer park constructed during 1984. Exploration of nearby claims was also part of the year's program.

Exxon Minerals Company spent over $1 million on land acquisition and exploration in the Hailey-Bellevue area of Blaine County. The company reportedly had about 25,000 acres under option or claim in the area in 1983 and added more in 1984, including a 320-acre state mineral lease on Della Mountain west of Hailey, a 660-acre lease from the Deer Creek Ranch, and additional patented and unpatented claims in Bullion Gulch and near the Red Elephant mine west of Hailey. State leases alone account for approximately 7,000 acres. Exxon is believed to be looking for stratiform base and precious metals in the informally named Dollarhide formation, a black shale unit widely distributed throughout this area of complex geology. During 1984, the company reopened old mines to get geologic information, did some drilling, and continued with extensive surface exploration.

Other companies active in the Hailey area included *Getty Oil*, drilling at the Triumph mine, and *Billiton Exploration U.S.A. Inc.* (a subsidiary of Royal Dutch Shell), exploring the Phi Kappa Formation that hosts the Phi Kappa mine east of Sun Valley. BMEX Corporation had three men working at the Anna mine in Scorpion Gulch.

Superior Oil Company's heap-leach operation at Stibnite closed down for the winter in November. The mine functioned normally during the season. Superior Oil mines about 500,000 tons of ore from the West End open-pit mine owned 25 percent by TRV Minerals of Vancouver, British Columbia. The mine and heap-leach operation employ about 130 people; 100 of them work for Western Construction Company of Boise, the mining contractor at the site.

Two events during the year were important for the Stibnite venture. In July, Mobil Oil bought Superior Oil for $5.7 billion. Rumors were widespread that Mobil intended to sell all of Superior's mining operations. TRV Minerals announced that they were interested in buying the Stibnite operation. In November, Mobil officials announced that the mine might close in 2½ years, five years earlier than expected, due to the low prices for gold and a decrease in estimated reserves. The Environmental Impact Statement for the project gave a 10-year life to the mine. With current gold prices, the life span is closer to 5½ years. Production at the heap-leach gold operation began in 1982.

The Delamar Silver mine in Owyhee County changed hands in September when *Nerco Minerals Company,* a subsidiary of Pacificorp (formerly Pacific Power and Light Company), purchased Mapco Inc.'s 52.5 percent share of the mine for $22.3 million. Nerco was interested in the property when it was for sale in 1982. Nerco is a relative newcomer to the minerals field but jumped into the business in a big way in 1982, buying the Candelaria mine in Nevada, one of the biggest open-pit silver mines in the world. With the addition of Delamar, Nerco will produce more than 3 million ounces of silver and 20,000 ounces of gold a year. Superior Oil Company (Mobil Oil) owns 47.5 percent of the Delamar mine. Mobil reportedly has its share for sale.

About 2,100 tons of ore per day is mined. In 1984, 4.9 million tons of ore and waste was removed from the Delamar mine, yielding 783,000 tons of ore. The operation employs 175 people, 100 at the mine, 60 at the mill, and 15 in administration and other duties. In August, mining started from the Glen Silver pit adjacent to the Delamar property. Glen Silver is owned by North American Silver Corporation of Pasco, Washington. About 6.34 million tons of ore has been blocked out in the new pit.

Continental Minerals Corporation settled a suit out of court with Superior Oil Company and will recover $1.57 million as part of 7.5 percent profits the company claims from the Delamar mine. No settlement has been reached with Mapco or Nerco for the remainder of Continental's claims.

Baker Resources Inc. plans to spend $625,000 evaluating 650 claims on the Twin Peaks property near the Delamar mine. The property is owned by North American Silver Corporation.

Six men worked at South Mountain,

south of Delamar, drilling and reconditioning tunnels. The mine there has been in an exploration phase for a number of years and is owned by W. A. Bowes Inc.

Exploration efforts continued by the *Iron Mask Mining Co.* and the *Silver Butte Mining Company* in the Talache district in Bonner County. Silver Butte has claims to 2,000 acres covering the Talache mine, which was active from 1917 to 1928. The mine had produced some 2 million ounces of silver. Iron Mask owns property adjacent to Silver Butte. Efforts at Silver Butte have concentrated on the Brown Bear tunnel. Two-man crews worked at both properties during the summer.

Hoskins-Western-Sonderegger (HWS Gold and Silver Ltd.) shut down the heap-leach operation at the Buster mine near Elk City. The site was the scene of a scare last year when it was reported that cyanide from the operation had contaminated Big Elk Creek that provides the water supply for Elk City. The false alarm was caused by bad analyses of water samples, although cyanide was present in the mine's monitoring wells. The company acted responsibly in dealing with the false alarm but in the face of adverse public opinion decided to close the operation.

Gold Resources Inc. started exploration at the Kimberly mine and the Golden Anchor mine in the Marshall Lakes district south and east of Riggins. The company agreed to a joint venture with Gold Cache Inc. in 1983 wherein each got a 50 percent interest in the two properties. The company plans to process tailings from both mines during 1984. Gold Resources, active in the area since 1979, has driven the Fisher tunnel over 600 feet and has reopened the Hickson-Bishop No. 2 portal at the Kimberly mine. A drilling program was scheduled for 1984 to locate the Golden Anchor and Swede veins at the Golden Anchor. The Golden Anchor had produced 30,052 ounces of gold and 120,000 ounces of silver before it was shut down by the War Production Board in 1942. According to company spokesmen, the mine is believed to have substantial reserves.

The *Golden Maple Mining and Leaching Company* submitted a revised proposal to the U.S. Forest Service in October for a modest cyanide heap-leach operation at the Valley Creek mine near Stanley. An environmental assessment is being conducted by an interdisciplinary team from the Forest Service and the state. The mine is within the boundaries of the Sawtooth National Recreation Area. The open-pit operation is on patented ground but will use federal land for the processing plant and leach pads.

Eagle Exploration Inc., a subsidiary of Big Turtle Mines Inc., gained control of the Homestake property near Sun Valley. The mine has 6,000 feet of underground workings. The company will explore the area for extensions of known veins. Big Turtle is evaluating thirteen precious metal deposits in Idaho and Oregon.

Circa Inc. began shipments of concentrates from its 50 ton-per-day plant at Mountain Home. Future production is estimated at 200 ounces of silver from ore mined at the Blackstone open-pit mine in Elmore County. The company reportedly has spent over $1 million on reopening the mine and building the concentrating plant. The concentrator used a unique alkaline-leaching process according to company spokesmen. During 1984, five men were employed at the mill and about 10,000 tons of ore was mined.

U.S. Antimony Corporation obtained a lease on the Red Bird mine in Custer County. The lease covers 19 patented and 9 unpatented claims and 3 patented mill site claims. The mine is 20 miles from the company's 250 ton-per-day mill and leach plant at Preacher's Cove on the Yankee Fork of the Salmon River. The company is sinking a 250-foot shaft below the surface accessible 900 level. Production is planned at 15-20 tons per day. In 1951 the mine was started from the 900 level but was stopped after 50 feet owing to the lack of funds. Over the past few years, U.S. Antimony has successfully mined ore and processed tailings from several mines in the Yankee Fork district including the Charles Dickens and Mt. Estes. An exploration program was under way at the Rob Roy mine. Fifteen miners are employed at the various mines, and five more operate the mill.

Silver King Mines Inc. resumed mining at the Iron Dyke and Bayhorse mines in Oregon. The mines were shut down in 1981 due to low metal prices. Ore from the two mines was processed at the Copper Cliff mill across the Snake River in Idaho at Cuprum. About 7,000 tons of chalcopyrite ore (2½ percent copper, ¼ ounce gold) was mined at the Iron Dyke and about 5,000 tons of tetrahedrite ore from the Bayhorse (.3 percent copper, 13 ounces silver). The mill was closed again on October 1, 1984, due to low metal prices. Some exploration work was conducted at the Red Ledge mine near Cuprum. The Red Ledge and Iron Dyke were purchased from Texasgulf Corporation in 1983.

Ore was crushed and stockpiled at *Shoshone Silver's* operation in the Lakeview district. The leach plant, completed in 1983, was not operated in 1984. An old tunnel was opened at the Kapco mine as part of an exploration program. The company plans to do surface work on the Weil group of claims that lie on an extension of the Hewer vein in the Idaho-Lakeview vein system.

Merger Mines Inc. was active at the Cedar Mountain property near Chilco Mountain in the Lakeview mining district. In 1983, the company drifted for over 400 feet on a lead-zinc-silver vein 150 feet below the surface. In 1984, the company started an adit 300 feet below the 1983 workings; the tunnel will eventually be 1,100 feet long. Little work is planned for 1985 due to low silver prices. The company started a program in the Gibbonsville area (Dahlonega district) and is opening old workings in Cyanide Gulch. Merger also has the Twin Brothers mine that was worked by Gibbonsville Premier Gold Mines Ltd. The mine produced gold from 1902 until it closed in World War II.

Gold Express Corporation will start a program in 1985 in Gibbonsville on claims just north of the old American Development Mining and Reduction Company (later called the Rescue Gold Mines Company) holdings. The property includes the Clara Morris vein that produced gold in the early 1900s.

Work continued on the seventh level of the *Lost Packer mine.* A new area was opened on the 15-inch-wide vein discovered in 1983. A drilling program explored below this vein, which is similar to the early producing veins in the mine that contained chalcopyrite carrying up to 5 ounces of gold per ton. Major production from the mine occured in the early 1900s.

Geodome Resources Ltd. initiated a stock offering at year's end to raise funds for a vat-leach operation at the Sunbeam mine. Mining is planned at 2,000 tons per day over a 10-year life span for the mine. Proven and probable reserves are 9.2 million tons averaging .30 to .04 ounce of gold per ton. Morrison-Knudson is doing the design work for the processing plant. The Sunbeam mine has been under study and development for the past few years by a succession of small companies. A large amount of drilling and development work has been done on the property.

Floyd Marshall continued work at the *Black mine* above the Yankee Fork of the Salmon River. A new drift was started on an upper level of the mine. Some ore was shipped in 1984, and plans call for increased production in 1985.

Excell Minerals continued development work at the Lucky Boy mine. The property has been under evaluation for several years.

Adera (British Columbia) was active in Navarro Canyon northwest of Mackay Dam. *Canorex* reportedly has an exploration program in Muldoon Canyon. A small pilot mill was set up in Camp Creek. The Carlin Brothers shipped some ore from the Lead Belt mine in the Lost River drainage. Bob Bemmin explored an area near the Mountain King mine on Sheep Mountain.

Marantha was inactive at the fluorite mine near Challis. A cave-in that happened late in 1983 on the main road that passes over the main adit was filled in by the U.S. Forest Service.

Tenneco Minerals drilled several percussion holes at the Red Mt. gold prospect on Hindman Ridge north of Stanley. This property was drilled by Noranda a few years ago. Another gold property between the Singheiser and Rabbits Foot mines in Lemhi County was also drilled by Tenneco and several holes were put down at the Mizpah mine in Latah County. Tenneco cut its minerals program in late year, and all of the above projects were either dropped or postponed.

Shell Minerals purchased Johns Mansville's claims in the Lava Creek district and will explore them in 1985. The district is a past producer of precious metals in Camas County.

A good ore showing was reported at the Fletcher mine near Carrietown.

A drilling program was carried out at the War Eagle mine near Dixie by *Award Resources.* An underground mapping and sampling program is planned for 1985. Six holes were drilled at two sites.

Agar Baretta and Ellis has a large development program at its Erickson Reef gold property north of Elk City. The program has defined an ore zone some 1,200 feet long and 500 feet wide with an average thickness of 50 feet. Estimated reserves are 2.5 million tons averaging .06 ounce of gold per ton. The company hopes to develop an open-pit, vat-leach operation next year, and will drill 50 more holes to better define the orebody.

There has been little activity at the Robinson Dyke mine near Dixie as development awaits higher prices for precious metals. Centennial Minerals drilled ten holes at the Frisco pit near Orogrande under an agreement with ABM Mining Group Inc., but it dropped the property in the fall.

Joy Mining is awaiting the outcome of a grizzly bear habitat study before continuing with development of its Tillicum Peak property in northern Idaho. Noranda and Cominco were actively searching for stratabound ore in the panhandle east of the Purcell trench.

Kennecott Copper continued work on a three-year gold exploration program on West Camas Creek in Clark County. *Exxon* reportedly drilled for gold in the Island Park area.

The leach pads and ponds were tested at the Comeback mine near Idaho City before closing down for the winter. The company plans to start production in 1985.

A tunnel at the Silver Bar mine was extended about 50 feet. The property is near the Banner mine northeast of Idaho City. Some work was reported at the Missouri mine in the Idaho City area.

The Yanke Machine Shop sunk a winze about 160 feet from the new 200 level developed by the company last year at the Talache mine at Atlanta. A narrow, high-grade gold vein is being explored.

Plume Creek Silver Mines Inc. operated a 25 ton-per-day mill and mined 400 tons of mill feed from its mine in Bonner County. Three men worked at the mine and two in the mill.

Fisher International Inc. mined 900 tons of ore for testing from the Carbonate mine above Slate Creek in Custer County. The company has a 120 ton-per-day mill at the mine and hopes to begin production next year.

Three men worked at the Big Buffalo mine in the Gospel-Hump area. A 10 ton-per-day pilot mill processed test ore at the site.

Anglo Bomarc drilled numerous holes at the Hercules silver property located 6 miles southeast from Brownlee Dam in Washington County. The property is currently on hold awaiting permits and further plans.

American Independence Mines and Minerals Company reported operations at the Golden Hand, Antimony Rainbow, Silver Shoot, and Fourth of July mines in the Edwardsburg district at the headwater of Big Creek. The company has a 75 ton-per-day mill and four men working underground.

Mountain Machinery and Supply Company at Hayden Lake continued to build custom mining equipment, specializing in placer machinery. A portable washing plant was marketed during the year.

Companies returning questionnaires and noting only exploration or assessment work are as follows:

COMPANY	COUNTY
Amador Gold Silver Mining Co.	Idaho
Burke Mining Company	Shoshone
Daggett Creek mines	Boise
Fourmile mine	Idaho
Friday Group	Gem
Gilmore Idaho Properties	Lemhi
Lloraine lode #1203	Idaho
Mt. King mine	Custer
Mountain View mine	Minidoka
New Hope mine	Blaine
Plume Creek Silver Mining	Bonner
Princess Blue Ribbon Mines (Boyd mine)	Camas
Queen Extension	Blaine
Salmon Canyon Copper Co.	Lemhi
Silver Strand mine	Kootenai
Sixmile mine	Idaho
Togo mine-Lawrence Minerals	Valley
Yellowjacket Mines Inc.	Lemhi

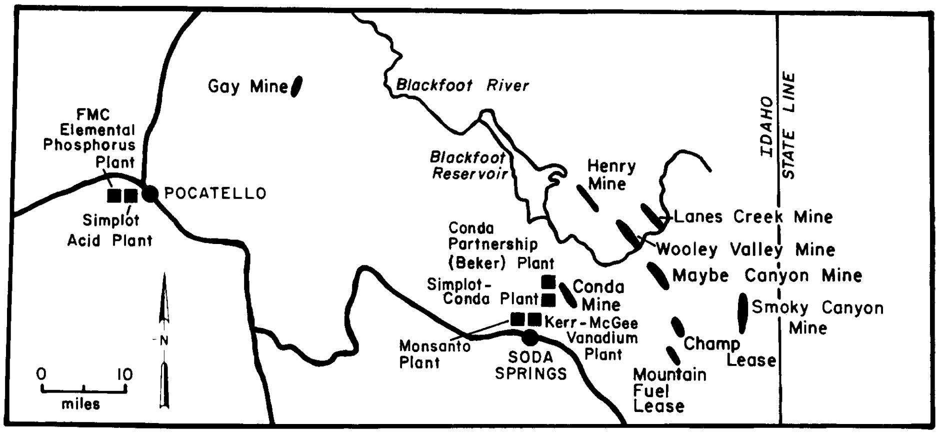

Figure 5. Location of active phosphate mines and plants in southeast Idaho.

NONMETALLIC MINERALS

Phosphate

Idaho's phosphate industry continued to emerge from the recession with a good year in 1984. Mines in southeast Idaho produce about 10 percent of the nation's phosphate. Phosphate is a major ingredient in agricultural fertilizer, and elemental phosphorus has a wide variety of uses in cleansing agents, industrial applications, and food products. About 90 percent of the country's phosphate goes into fertilizers and the remaining 10 percent into elemental phosphorus. About 25 percent of the phosphate is exported, and 30 percent is processed into chemicals and fertilizers for export. Exports and agricultural use are important factors in phosphate economics. Although phosphate prices remained low for the year, all companies produced at near capacity.

The locations of major mines and processing plants are shown in Figure 5. Companies produce two primary products, elemental phosphorus (Monsanto, FMC and Stauffer) and phosphoric acid (Simplot and Beker). All of the mines are open-pit operations in the Phosphoria Formation.

Monsanto maintained full production all year from the Henry mine and its elemental phosphorous plant at Soda Springs. Almost 1 million tons of phosphate ore was mined. The plant employs 400 people, and another 100 work at the mine.

The usually smooth operation at *FMC Corporation's* facility at Pocatello, the largest elemental phosphorous plant in the world, was disrupted in early May by a strike. About 400 workers walked out in a dispute over wages and benefits. FMC employs about 585 people at the Pocatello plant. The facility was operated during the strike by salaried employees. A new contract was ratified at the end of May. Phosphate ore for the FMC plant comes from the Gay mine on the Fort Hall Indian Reservation. About 160 workers are employed at the mine, which is leased by FMC and Simplot and operated by Simplot. Approximately 2 million tons of ore is mined annually for FMC's plant and 300,000 tons for Simplot's acid plant next to FMC at Pocatello. Electrical power can be a problem for the elemental phosphorous producers, as the process is energy intensive, but there were no supply interruptions in 1984. FMC uses about 15 percent of Idaho Power's electricity. The company subcontracts to another operator for the mining of quartzite from its Wells Cargo quarry. The quartzite is used as silica flux.

The *J.R. Simplot Company* began work on a $50 million plant expansion at Pocatello. Under construction is a 2,000 ton-per-day sulfuric acid plant, a 650 ton-per-day phosphoric acid plant, and a new super phosphoric acid plant. Construction of the new plants should be completed by November 1985. The company also plans to build a generating plant and wants to sell excess electricity to Idaho Power. The plant will generate 8,000-12,000 kilowatts when completed in 1986. Simplot employs about 550 people at the Pocatello plant.

The first ore from Simplot's new $40 million Smoky Canyon mine was processed in midyear. The mine has reserves for 25-30 years at an annual production of nearly 2 million tons. The mine replaces the exhausted Conda mine. Ore from Smoky Canyon, near the Idaho-Wyoming border, is pumped through an 8-inch diameter, 27-mile-long pipeline to the processing plant at Conda. Two 1,000-horsepower pumps drive the slurried ore. At Conda about $8 million in new filtering and drying equipment was installed to dry the slurry. The mine employs about 100 people and the processing plant at Conda another 60.

Beker Industries employs about 250 workers at the Charles F. White acid plant which produces 300,000 tons of phosphoric acid per year. Another 150 work for the *Conda Partnership,* a joint venture between Beker and Western Cooperative Fertilizer Corporation of Canada. Phosphate ore is mined from the Champ lease 5 miles north of the company's Maybe Canyon mine. In 1984, about 3 million tons of ore was mined from the Champ lease and about 200,000 tons from Maybe Canyon. Next year the partnership will open Mountain Fuel's lease to replace the Champ lease. About half of the ore goes to Beker's plant and half to Western's plants at Medicine Hat and Calgary. Washington Construction Company is the mining contractor for the partnership and employs about 300 people.

Stauffer Chemical Company shipped ore from the Wooley Valley mine, starting in May. The mine had been shut down since April 1982 due to the poor market. Approximately 400,000 tons of ore was mined. The ore is shipped to the company's elemental phosphorous plant at Silver Bow, Montana. Twenty-seven people are employed at the mine.

The *Alumet Company* mined 37,000 tons of phosphate from the Lanes Creek mine. The company employs three people at the property.

Kerr-McGee did not mine any limestone from the Trail Creek mine in 1984. The company uses lime in a process to extract vanadium from ferrophosphorous slag that is a by-product of Monsanto's elemental phosphorous plant. The demand for vanadium was off due to the downturn in the steel industry. The company employs thirty-nine people at the vanadium plant and one at the limestone quarry.

A landmark five-year wildlife/phosphate study was completed. The study was a joint effort between five phosphate companies, the Idaho Department of Fish and Game, the Caribou National Forest, the U.S. Bureau of Land Management, and the U.S. Fish and Wildlife Service. The phosphate industry contributed more than $250,000 to the study.

Other Industrial Rocks and Minerals (Figure 6)

The *Marble Shop Inc.* at Idaho Falls had a slowdown in sales of travertine (limestone) decorative stone that is quarried from the Fall Creek mine, 30 miles southeast of the processing plant at Idaho Falls. The strong dollar favors Italian travertine, which can be imported cheaper than it can be mined and shipped in Idaho. The company is still researching the potential for using ground travertine for industrial lime as the travertine is very pure. The plant employs twenty people and another six work in the quarry.

The Nez Perce Tribe produced 37,000 tons of limestone from the *Mission Creek limestone quarry* on the reservation near Lapwai. Most of the limestone was sold to Potlatch Corporation's paper plant at Lewiston. Fourteen men are employed in mining the lime.

In spite of a dispute over labor contracts, *Ash Grove Cement West Inc.* maintained normal operations at the only cement plant in Idaho at Inkom. About 302,000 tons of limestone was mined from a pit behind the plant. Ash Grove employs five men at the mine and sixty-eight at the mill.

Consumer Cooperative in Weiser mined about 7,000 tons of gypsum for agricultural use from the Iron Mountain mine in Washington County. Mining and hauling are contracted to the Hansen Building Company. The Co-op will not mine gypsum in 1985 because it can be obtained cheaper from Nevada.

Amcor Inc. produced pumice from its mine at the Fan Creek claims. All of the pumice is used for light-weight aggregate at its block plant in Idaho Falls.

Producer Pumice mined over 12,000 tons of pumice from the Rock Hollow mine near Ammon. Three men work at the mine.

Hess Pumice will build a new processing plant at the Malad Industrial Park. The company mines pumice from a very pure and large deposit at the Wrights Creek mine near Malad. Fifteen people are employed at the mill and five at the mine. Pumice has a wide variety of uses as an abrasive and as a filtering agent.

Oneida Perlite mines perlite from a very pure deposit next to the Wrights Creek pumice mine. Several 300-foot holes drilled at the mine failed to reach the bottom of the deposit where the material is exposed over 6,000 acres. Perlite is a volcanic glass that when heated dehydrates and pops something like popcorn. It makes an excellent light-weight aggregate and is used as a filtering agent and in fireproofing. The company manufactures expanded perlite under the trade name Perlcor Products and pumice under the Vulcan Industrial Pumice label. The business employs four men in mining and five at the plant.

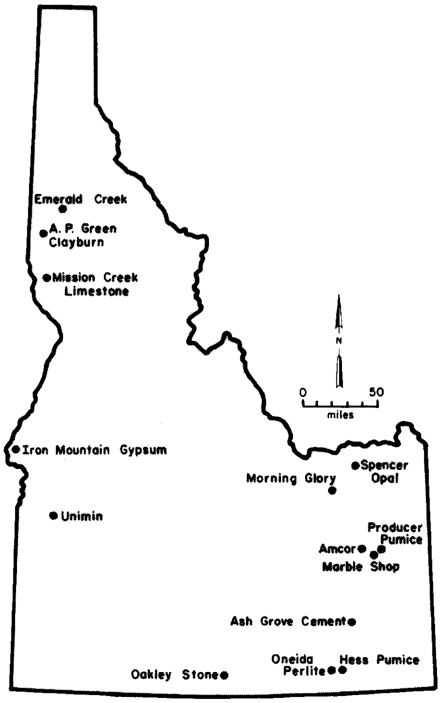

Figure 6. Location of some active industrial rock and mineral mines and plants in Idaho.

The *Emerald Creek Garnet Milling Company* produced 400 tons of finished product per month at one of the largest garnet operations in the United States. The garnets are dredged from Carpenter and Emerald creeks using draglines and washing plants. A jig plant further refines the garnet concentrate that is then dried, sized, and shipped from a plant near Fernwood. Garnet is used as an abrasive and as a filtering medium. Twelve men are employed in the placer operations and eight more at the mill. This is the largest placer operation in Idaho and has an excellent reclamation record.

A.P. Green produced fire brick at the Troy plant all year but experienced a slowdown in the last quarter. The company makes a refractory brick used by aluminum companies for their furnaces. A new brick press was installed in the plant as a replacement. Clay for the bricks is mined from state leases near Helmer. About 6,000 tons of clay is used each year. The plant employs ten hourly workers and three salaried employees. A.P. Green will celebrate its 75th anniversary in 1985.

Clayburn Industries periodically shipped clay from deposits near Bovill. The clay is sent to its brick plant in Abbotsford, British Columbia. The property is leased from J.R. Simplot Corporation, which had mined clay for a paper filler in this area for many years. Clayburn plans to start mining clay in 1985.

Spencer Opal finalized patent applications for its claims in Clark County. Opal is mined from the claims and is also dug by "rock hounds" for a fee.

E.J. Wilson and Sons shipped some limestone from the Morning Glory claims near Dubois in Clark County. Most of the lime is used as an animal food additive.

Unimin Corporation continued normal operations at its silica plant near Emmett. The silica is used in manufacturing glass containers and other glass products. The plant employs three salaried and eight hourly employees.

A relatively new mining industry in Idaho is the state's decorative building-stone operations centered at Oakley. The decorative quartzite is currently quarried by five companies: *Northern Stone, Ernie Ray Hale Quarries, Star Stone Company, Oakley Valley Stone,* and *Idaho Quartzite Corporation.* Three types of rough quartzite are produced: thin "slate" slabs, 1 inch thick or less; patio stone; and building stone in brick-sized pieces. In addition, two companies, West Pac Stone and Idaho Quartzite, cut the stone into tiles. The quartzite comes in different natural colors. The companies have exacting standards to ensure conformity with construction requirements. Sales of the attractive quartzite are increasing. One of the companies, Idaho Quartzite, mined over 1,500 tons of quartzite in 1984 and employed five people in mining operations.

Oil and Gas

The status and location of oil and gas wells, drilling or permitted, in Idaho for 1984 is shown in Figure 7. Since 1903 companies have spent over $200 million in drilling and geophysical exploration. Interest in the Overthrust belt has slowed recently due to the world oil glut and a general decline in oil and gas exploration nationwide.

The first deep wildcat well west of the Rocky Mountain trench was spudded early in the year at the Paul Gibb No. 1 in Flathead County, Montana, 35 miles west of Kalispell. Atlantic Richfield Company drilled the well with Marathon Oil as a partner. The well was drilled to test an anticline on the Pinkham thrust plate as interpreted from a seismic survey. In October, having reached a depth of 17,774 feet, the test was declared a dry hole. Results are confidential but will be released in 1985. Large tracts in northern Idaho and western Montana are under lease for oil and gas based primarily on the potential of the Arco well.

The J.R. Simplot Company plans to produce alcohol from potato wastes at its plant at Rupert. The alcohol will be used as an additive for gasoline. It is intended to raise the octane level and be used as a substitute for lead, which is being substantially reduced in gasoline by the Environmental Protection Agency.

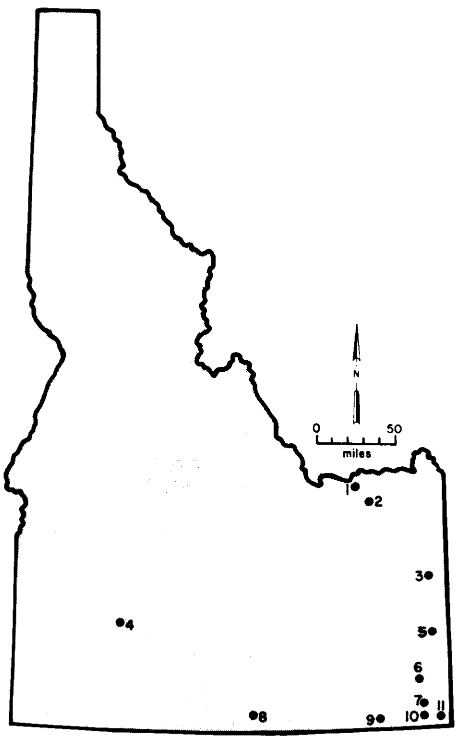

Figure 7. Exploratory oil and gas wells in Idaho for 1984.

OTHER DEVELOPMENTS

The Wallace Centennial officially began on May 19. Eighteen-hundred people, including many state officials and dignitaries, attended the ceremony. Prominent Idaho politicians included Governor John V. Evans, Senators James A. McClure and Steven D. Symms, and Representative Larry E. Craig. The successful program was put together by Harry F. Magnuson. Even the outcome of a rainy day could not dampen the enthusiasm of the citizens of Wallace. A festive barbecue (featuring a 400-pound birthday cake), centennial ceremony, and dance came off without a hitch. Many celebrants attended in period dress, and men sported beards grown for the occasion.

Other centennial events were held during the year. As part of Slippery Gulch Days in June a mining claim was raffled off. The claim on Canyon Creek was donated by the Hecla Mining Company. A special one-ounce silver medallion was minted for the centennial, and a time capsule was buried near the Shoshone County Courthouse. Two plays entitled *The First Hundred Years* and *The Go-Devil Boys*, by Tim Rarick, were presented during the year. The Idaho Geological Survey put together a 1½-hour videotape about the district's history. The presentation contained over 300 pictures, many from the Barnard-Stockbridge photographic collection at the University of Idaho. The Elks Club provided a big hit with a pin depicting a provocative young lady loitering under a red street light. The significance of the pin is well known to "Inland Empire" residents. All proceeds from the pin's sale went to the Wallace Elk's Youth Activities Fund. The Sierra Silver Mine tour, sponsored by the Chamber of Commerce, and the Coeur d'Alene District Mining Museum had record attendance. Over 14,000 people took the mine tour in this the third year of operation. The closing ceremony for the centennial was held on September 30.

The 2nd session of the 47th Idaho Legislature passed several important bills pertaining to the state's mineral industry and natural resources. The Idaho Geological Survey arose from the ashes of the Bureau of Mines and Geology. Senate Bill 1269, establishing the IGS, was signed into law by Governor John V. Evans on March 30, 1984. The bill removed the IGS from the Idaho Department of Lands and made it a special program at the University of Idaho. The IGS's advisory board was expanded from four to nine members, and the responsibilities of the agency were modernized. The director of the IGS is now officially the State Geologist. By mandate, the IGS is the lead agency for the collection, collation, and dissemination of all geologic and mineral-based data for the state. The agency is also able to set up branch offices at Idaho State University and Boise State University when funding permits. The Idaho Mining Association was very supportive of the legislation, and Jack Peterson, executive

MAP LOCATION	COMPLETION DATE	SEC.		LOCATION TWP.	RGE.	OPERATOR	WELL NAME	STATUS/ TOTAL DEPTH
1	1984	NENE	24	13N	34E	SHELL	TARGHEE FEDERAL NO. 1-24	permit
2	1984	SENW	25	12N	36E	SHELL	HAGENBARTH NO. 22-25	drilling
3	1984	SWSE	4	2N	44E	ANSCHUTZ CORP.	USA 0356 NO. 15-4	permit
4	1984	SENE	34	5S	8E	R & T EXPLORATION	JOE ELLIOT NO. 1	*
5	1984	NWSE	6	5S	45E	SUN	TINCUP MOUNTAIN FEDERAL NO. 1	drilling
6	1984	SENW	2	11S	42E	GULF	MECHAM HOLLOW FED. 1-2-1C	permit
7	1984	NESW	34	14S	43E	MURPHY OIL	WORM CREEK NO. 1	7,493
8	1984	NWNW	31	15S	24E	HUGHES GROUP	NICHOLSON NO. 1	drilling
9	1984	SENE	26	16S	37E	HIGH PLATEAU OIL & GAS	HIGH PLATEAU NO. 1	*
10	1984	SWSW	15	15S	43E	JAGEE-LETTS	JAGEE-LETTS NO. 1	permit
11	1984	SWSW	5	16S	46E	SOHIO	SWEETWATER NO. 5-13	11,617

Adapted from *Oil and Gas Exploration in Idaho, 1983-1984*, by Roy M. Breckenridge. Idaho Geological Survey Technical Report 84-6, 1984.

*drilling temporarily suspended.

director of the IMA, was most helpful in shepharding the bill through the legislative maze.

Three bills that regulate hazardous waste were passed. Two dealt with Transportation and Commercial Treatment Site Fees and Reporting, and the third established an Interim Committee to Examine Siting. The bills were inspired by grave concerns over the Envirosafe Service Inc.'s waste storage site near Grand View. The site is located at an abandoned Minuteman missile complex. An estimated 75 truck loads of hazardous waste a day cross Idaho to the Owyhee County site. Local citizens were alarmed in June when a flash flood washed through the area. In August the Environmental Protection Agency fined Envirosafe $150,000 for violations ranging from leakage of toxic wastes to improper sampling of newly arrived materials. It was the second fine levied against the company in less than a year.

The state dredge and placer mining statute was revised. The new law mandates several things: settling ponds are to be used if mine water is returned to a natural water course; the state Board of Land Commissioners has the right to fix the amount of reclamation bonds (formerly $15,000/10 acre site); placer/dredge operations are to be periodically inspected; a reclamation account is to be set up for dredge and placer mining; and the Land Board is empowered to bring civil actions and levy fines against mining violators.

Another environmental problem occurred near the historic gold camp of Florence. Two companies, Powell Mining Company and MicroGold II Partnership, were accused by the Idaho Division of Environment of mercury contamination at their placer operations. The problem was discovered late in the year. Clean-up will have to wait until spring due to the severe winters at Florence.

The state Land Board wrestled with a controversial land swap in northern Idaho. Diamond International wants to develop the prime beach front property it owns at Huckleberry Bay on the east side of Priest Lake. The area is surrounded by state land. Diamond has proposed to swap other Diamond lands for the state land near the lake. Some local residents oppose the plan. A decision is expected from the Land Board next year.

The wilderness issue in Idaho continued to be hotly contested. Senator James McClure proposed an additional 526,000 acres of wilderness for Idaho in response to requests from the wood products industry. The industry was concerned about a California court decision that in effect threw out the Rare II study results and could have placed acreages that were supposedly released for multiple use under RARE II back in the wilderness study classification. Timber sales scheduled for some of these lands would therefore be postponed or possibly canceled. Representative John Seiberling (Ohio), chairman of the House Subcommittee on Public Lands and National Parks that has to approve new wilderness, proposed 1.2 million acres. This number was supported by Governor John Evans. Seiberling visited the state in July to see proposed wilderness areas first hand. The year ended with the final decision on Idaho's wilderness unresolved. Congress will probably have to make a decision in the future. Outside of Alaska, Idaho has the largest wilderness area in the nation, with 3.8 million acres.

The River of No Return Wilderness was renamed the Frank Church River of No Return Wilderness in honor of Idaho's nationally-prominent former senator. The late senator was instrumental in obtaining wilderness status for the 2.2-million-acre preserve in central Idaho.

In January, Stanley Hamilton was named the new director of the state's Department of Lands. Hamilton came to Idaho government from Oregon's Division of State Lands. The position of director was vacated in late 1983 when Gordon C. Trombley, who had held the post since 1974, announced his retirement after 31 years of state service.

In February, William L. Rice was appointed to the U.S. Bureau of Mines' state liaison office for Idaho and Montana. Rice is a coauthor on this report and has helped the IGS with mineral statistics and data collection for a number of years.

The federal government's concern about strategic and critical minerals is illustrated by the award of $7 million in research funds to the Idaho National Engineering Laboratory (INEL) at Idaho Falls. Research will focus on advanced alloys, microbiological assisted mineral processing, metal-gas reactions in thermal plasmas, surface coatings to prolong the life of different materials, and extractive metallurgy.