

MINERALS, MINING AND ENERGY

IN IDAHO, 1987

PRELIMINARY DRAFT

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Information Circ.**

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INTRODUCTION

The purpose of this paper is to summarize and describe all mining and mineral related activity in Idaho for 1987. Sources used to compile this document include U.S. Forest Service and Bureau of Land Management mineral specialists in the state, the U.S. Bureau of Mines, information from the Mine Safety and Health Administration (MSHA), numerous company geologists and spokespersons, and clippings from area and trade newspapers and periodicals. This preliminary version is for the sole use of the U.S. Bureau of Mines, the Idaho Mining Association, the Idaho Geological Survey, and the state's Congressional delegation. Locations of selected cities and towns referenced in this report are shown in Figure 1.

The value of Idaho's nonfuel mineral production (Table 1) decreased from \$274 million last year, to \$269 million in 1987. A significant rise in the value of gold production, and lesser increases in the values for crushed stone, construction sand and gavel, vanadium and garnet were insufficient to offset decreases in the value of phosphate rock, silver, and molybdenum production.

Silver was the leading mineral commodity in terms of value, followed by phosphate rock, gold, and molybdenum. The metallic minerals copper, gold, lead, molybdenum, silver, vanadium, and zinc accounted for 58% of the State's nonfuel mineral value for the year compared with 52% in 1986 and 59% in both 1985 and 1984. Idaho ranked first in the nation in garnet and vanadium production, second in silver output, third in the production of phosphate rock, molybdenum, and lead, and fourth in pumice production. The state ranked 31st nationally in the value of nonfuel minerals production compared to 32nd last year.

The reopening of three Coeur d'Alene district silver mines and one phosphate operation during the last half of the year was insufficient to offset personnel cutbacks at Cyprus' Thompson Creek molybdenum mine and other operations. The number of workers employed in metal mining declined to 1,600, almost 16 percent below the 1986 figure. Overall, mining employment fell from 2,900 workers last year to 2,600 in 1987. Mineral industry wages continue to be the highest for any industrial group in the state.

ACTIVE MINES AND PROCESSING PLANTS

Coeur d'Alene Mining District. (Figures 2 and 3)

Figure 1 here

Table 1 here

Introduction

Underground operations resumed at the Lucky Friday mine, the Sunshine mine and the Bunker Hill mine by the end of 1987, reversing last year's closures. Silver production dropped to 6.4 million ounces from 9 million ounces in 1986 and 16.6 million ounces in 1985, the last year of full operations in the district. Almost all of the production is accounted for by the Coeur and Galena mines that were at full capacity all year. In addition to silver, the mines produced 4,549 tons of lead, 2,226 tons of copper, and 989 tons of zinc. Total value of all metals for the year was \$53.2 million, down from \$61.2 million last year and \$128 million in 1985 (figures from Don Springer, 1987).

Asarco, Inc.

By a vote of 300 to 294, the Steelworkers Union ratified a new three year contract in February with Asarco that included a 28 percent pay reduction in the first year. Wages were cut but not benefits. At the Galena (Local 18) the vote was 92 to 49. This marks 22 years of continuous operations at the Galena without a labor dispute or economic layoff. The mine employs 223 workers.

The company installed a supplemental cooling system in the Galena mine ventilation system. Cold water is sprayed across the ventilation inlet, effectively lowering air temperature. The "swamp cooler" design was modified from a similar system used at the Sunshine mine.

Production from the Galena mine was 3,426,710 ounces of silver from 200,750 tons of ore versus 3,953,910 ounces from 200,819 tons last year. There was development work on the 5200 level near the Silver Vein, and the No.3 shaft station was enlarged and retimbered on the same level. Drifts were continued on the 4000 and 4900 levels towards the Argentine vein near the west end of the property.

The Coeur mine set a production record in 1986 of 2,760,517 million ounces of silver. Production in 1987 decreased to 2,535,610 ounces of silver from 154,555 tons of ore. Development work in the mine was centered on the 356, 400, 425, and 483 veins and shaft rehabilitation continued on the 3900 level.

There was no further work on the American Silver project in 1987. The Wire Silver vein, the target of the exploration venture, is only 345 feet away from the end of the 5,128 foot long drift that extends from the 3400 level of the Coeur mine.

Bunker Ltd. Partnership

There was good news in October from the Bunker Limited Partnership (BLP) when twelve miners were recalled to work at the Crescent mine. The men will deepen the shaft from the 5100 to 5260 level. The mine closed in May of last year. The shaft work is part of the Partnership's long range exploration and development plans for the Crescent.

Figure 2 near here

Figure 3 near here

Some details concerning the original purchase agreement for the Bunker Hill mining, smelting and refining complex between BLP and Gulf Resources Chemical Company were released during the year. The Partnership bought the Bunker Hill Complex in 1981 for \$9.8 million, including \$4 million down and \$7 million in promissory notes. A tax kickback from Gulf made up the difference. The companies' battle with EPA over the past few years may have been, in part, influenced by the purchase agreement.

The settlement of \$4.5 million resulting from state action last year against companies in the district will go towards the Superfund cleanup effort of a 21 square-mile area including the Bunker Hill complex. The fund is composed of annual \$900,000 payments from Gulf, Sunshine, Asarco, Bunker Ltd. Partnership and Coeur d'Alene Mines Corporation. The Bunker cleanup is EPA's top priority project for Superfund cleanup in the Pacific Northwest and could cost as much as \$60 million.

In February, Gulf Resources offered a 400-page plan for participating in the Superfund cleanup of the Kellogg area. The company will be involved with efforts in non-populated areas. Gulf retained Dames and Moore as consultants for their part of the project. Woodward Clyde was hired to represent the EPA on remedial contracts at the site and CH2M Hill will watch out for state interests, concentrating on cleanup of populated areas. Jacobs Engineering was retained by EPA in November to take over the job done by Woodward Clyde in compliance with REM II, contractual restrictions.

In April, Silver Valley Laboratories moved from Osburn into the old Bunker Hill lab building. The company will do analyses for the Superfund cleanup as well for their extensive mining-related business. Silver Valley employs 37 people and may add more as the cleanup progresses and more environmental analytical work is generated. New equipment has been installed, including a sulfur analyzer and computers for automating analytical equipment.

Bunker Limited received praise for its dust control project on the 150-acre Bunker Hill tailings pond. The company piled smelter slag on the pond and installed sprinklers in other areas.

In September, a tentative settlement was reached with about 3,000 pensioners from the old Bunker Hill Company. The pensioners filed a class action suit against Gulf for medical benefits that were cut off in 1982 after the Bunker Hill complex was sold to the Partnership. A jury ruled in favor of the pensioners late last year. Gulf and/or the Partnership will have to pay medical benefits that could total as much as \$60 million over the next 50 years. The Partnership's liability for the benefits is unknown but it could be substantial. Late in the year BLP and Gulf each filed suit against each other regarding this liability.

In May, Jack Simplot backed out of the Partnership. Duane Hagadone and Harry Magnuson also quit but kept their interest in Bunker Hill Properties. Jack Kendrick is the only original partner left in BLP.

Rumors of Canadian interests in the Bunker Hill mine surfaced in August. Mentioned were Cominco and Pegasus. Reported plans called for BLP to operate the mine and ship to the Cominco smelter at Trail, B.C. In October, another rumor implied that Canarim Investment Corporation of Vancouver, B.C., would finance reopening the mine by raising \$6.6 million. The money would be raised by selling three million shares of stock at \$2.85 a share in a new Bunker Hill Mining Company. Canarim has put their plans on hold awaiting the outcome of the lawsuits between Gulf and BLP over the pensioner's medical claims settlement.

Callahan Mining Corporation

Callahan Mining Corporation is the owner of the Galena mine. In February, Callahan sold 563,380 shares of newly issued stock for \$10 million to State Farm Insurance Company. The company wants to expand its Ropes Gold mine in Michigan from 2,000 to 3,000 tons a day, thereby increasing gold production from 60,000 to 90,000 ounces annually. Ropes was the company's largest revenue source producing some 43,000 ounces of gold in 1987. Callahan had earnings of \$2.6 million for the year versus \$405,000 last year.

Coeur d'Alene Mines Corporation

Coeur d'Alene Mines Corporation enjoyed its best year ever with income of \$11,201,855. This compares to a loss of \$4.7 million last year. The company gets revenue from the Coeur mine, the Thunder Mountain mine, and the Rochester mine in Nevada. The company has 9.9 million shares of stock outstanding.

The Thunder Mountain heap-leach gold mine reached full production, yielding about 27,250 ounces of gold and 31,840 ounces of silver. Reserves at the mine are 1.6 million tons of .055 ounces per ton gold. The adjacent Lighting Peak area contains additional reserves of 650,000 tons of .041 gold. The Pacific Northwest Pollution Control Association presented an award to Cda Mines for its environmental record at the mine. The company leases the property from Thunder Mountain Gold, Inc.

The Rochester mine in Nevada produced 4,010,547 million ounces of silver and 26,821 ounces of gold this year. Morrison-Knudsen Company, the mining contractor, had some problems with the crushing plant early in the year that have now been solved. Almost 15 million tons of new reserves were discovered at Rochester during the year.

In August, Cda Mines bought the Kensington Gold mine located about 50 miles north of Juneau from the bankrupt Placid Oil Company owned by the Hunt Brothers of Dallas, Texas. The purchase price was \$20 million. Cda immediately sold a 50 percent interest in the mine to Echo Bay Mines for \$10 million. Each company will pay half of the estimated \$60 million needed to develop the mine. Echo Bay will be the operator. As part of the deal, Echo Bay transferred 50 percent of its interest in mines in Panama and Chile to Cda mines, who will develop and explore the properties.

The company announced a merger with Royal Apex Silver in November. One share of Cda Mine's stock was swapped for 5.45 shares of Royal Apex' stock. Royal Apex owned the Rochester mine in Nevada and has worked closely with Cda Mines on several projects over the past few years.

In May, Cda Mines redeemed \$25 million in convertible subordinated debentures (yielding 9 percent) that were due in 2005. In June, the company sold \$50 million in convertible bonds due June 10, 1992 in Europe. The bonds yield 6% percent interest and can be exchanged for company stock. Funds were also raised in December of last year by selling 1.1 million shares of stock for \$17.8 million.

The company received the Nicholson Award given by the National Association of Investors Corporation for the "best 1986 annual report for the individual investor" in the silver industry competition.

Hecla Mining Company

Hecla was in the black in 1987 making profits of \$10.3 million compared to a loss of \$21 million last year. The Lucky Friday mine reopened and the Republic unit became the most important property owned by the company. Hecla was named as one of the best 20, U.S. companies to invest in by USA Today.

The company dedicated the \$2.2-million Golden Promise shaft at the Republic unit in Washington. Republic had been declared "mined out" three times, twice by Day Mines, Inc. and once by Hecla. The new shaft will service mining from the Golden Promise No. 1 and 2 veins "rediscovered" in 1984 by Hecla geologists.

The Escalante mine in Utah continued with full production all year. The open pit mine produced 2.3 million ounces of silver from 294,098 tons of ore.

Hecla's industrial minerals companies contributed to profitability. The Colorado Aggregate Company mines scoria for use in gas fired barbecues and the Kentucky-Tennessee Company operates ball clay facilities that account for about 50 percent of U.S. production. Ball clay is used as a bonding agent in pottery, sanitaryware, floor and wall tiles, dinnerware and electrical porcelain.

Development of the Lucky Friday Underhand Longwall (LFUL) mining method continued during the year even though the mine was closed. The effort was hampered when fifteen miners were laid off at the LFUL project in January, leaving 12 salaried and 10 hourly workers in the mine. The LFUL system will increase productivity and decrease the danger from rock bursts below the 5000 level of the mine. The sandfill plant at the Lucky Friday mine was expanded at a cost of \$1.2 million to support the LFUL system.

Hecla purchased a 28 percent interest in the Greens Creek mine in Alaska from Amselco for \$45 million. Amselco will be the operator. This will be the largest domestic silver mine, producing an estimated 8.5 million ounces per year from ore that averages 24 ounces of silver per ton.

In April, Steelworkers Local 5114 and Hecla resumed negotiations for a new labor contract. The company asked for wage cuts of over \$3.50 per hour and cuts in benefits. An incentive was a bonus tied to the price of silver at or above \$8 per ounce. The union rejected the offer 85 to 9. Hecla declared an impasse in labor negotiations. The mine, closed on unlucky Friday, April 11, last year by low silver prices, was reopened on June 1 without a contract. Eighty miners were called back on May 30. Forty men were back at work by June 4 and 72 more by June 25. A new three-year contract was signed late in August. It incorporates profit sharing tied to metal prices based on \$8 silver, 32 cent lead, and full production at the mine. The profit sharing plan will start next year.

William A. Griffith, chairman and CEO of Hecla, received the AIME award in March, naming him Honorary Member. There are only 187 honorary members in AIME. Griffith retired from Hecla on May 31 and Arthur Brown took his place as President and CEO. Mr. Brown was named Chairman in August. Mr. Griffith was given a 30-inch statue called "Deep Enough" that contains 500 ounces of Lucky Friday silver. The statue is of a mature, dignified miner leaving the mine at day's end.

Hecla will complete a marketing and feasibility study on the Highwood-Thor Lake beryllium and rare earth prospect in March next year. If the study is favorable, Hecla can earn a 50 percent interest in the venture and will be the operator of the property. The deposit contains reserves sufficient to produce one million pounds of beryllium annually for at least 30 years. The cost of developing the mine will be about \$30 million. Highwood Resources is the owner of the property that is located in northern Canada.

Hecla is evaluating a gold mining venture at Stibnite. The company inherited the property from Ranchers Exploration. Plans call for leaching old tailings and oxide ore at Stibnite, if an arrangement can be reached with Pioneer Metals to use their leach plant at the site. Hecla would employ about 35 people at the operation. They may also explore the Homestake property adjacent to the old pit at Stibnite. The Homestake contains an estimated reserve of 800,000 tons of refractory ore containing .10 ounces of gold per ton.

The Consolidated Silver Corporation (a joint venture between Hecla and Coeur d'Alene Mines Corporation) was shut down in August of last year. The \$17 million, seven-year exploration project was officially dropped in November. The purpose of the ConSil program was to explore the old Silver Summit mine area at depth. As part of the project, the Silver Summit shaft was sunk to the 5200 level and drilling and underground exploration were carried out on several levels. Some sub-economic mineralization was encountered on the 5400 and 4000 levels.

The Hecla Mining Company of Canada (a Hecla subsidiary) obtained an option to acquire a majority interest in the promising Mooseland gold property in Nova Scotia owned by Acadia Mineral

Ventures Ltd. of Toronto, Canada. Hecla also has an interest in the 5,000 acre Baxter gold property located in the Carlin trend in Nevada.

Sunshine Mining Company

Sunshine Mining Company operates the Sunshine mine and silver refinery on Big Creek and has oil and gas interests. The "Shine," probably the largest single producing silver mine in history, was closed down in April of last year due to low metal prices. The company had a \$103 million loss in 1986, its worst year ever. The red ink continued this year but at a slower pace, with a loss of \$51 million. In August, the company sold 12 million shares of stock at \$7 per share, for a total of \$84 million. The money will be used to buy back silver-backed bonds due 6/1/97 and for operating funds.

Management began labor talks with the Steel Workers Union (Local 5089) in April, when the old labor contract ended. This contract called for a 35 percent cut in wages and benefits but offered a bonus tied to the price of silver. The miners rejected this offer by a vote of 149 to 2. The company did get the electricians to agree to a contract in July but this only affected about 20 employees. Negotiations with the Steelworkers Union were reopened in August but there had been no progress by November. The company threatened to open the mine without a contract by declaring an impasse, as Hecla did earlier in the year. On November 23, without officially declaring an impasse, and without union acceptance of its latest contract offer, the Sunshine mine reopened. This latest proposal called for a 25 percent cut in wages and a nine month delay in implementing a wage scale tied to silver prices and mine production. The union called for a vote on the contract and if rejected, to consider a strike. Plans for reopening the mine included recalling 66 laid-off employees and having a full complement of 450 workers back at the mine in 90 days. The company would like to get production costs for the Sunshine mine down to about \$5.50 per ounce, down from the \$7.00+ per ounce of silver they had before the mine closed.

The opening of BP Minerals' (formerly Kennecott) modernized Bingham Canyon copper mine and smelter had a direct benefit for Sunshine. The company's Trixie mine in the Tintic district has been reopened and gangue from the gold/silver mine is used as flux at the BP's smelter. About 1,500 tons per month will be mined under the new contract.

Sunshine announced plans for opening the Blackfoot mine, a small gold venture near Lincoln, Montana. This will be the company's debut in Montana. The mine is in an environmentally sensitive area. Production at the open-pit, cyanide heap-leach mine is estimated at 15,000 ounces of gold per year over a five-year period.

In January, Sunshine entered a joint venture with First Sierra Assets Inc. of San Francisco to explore and develop the Snow Caps gold property in Inyo County, California. Waste stripping started in late January for the proposed heap leach operation.

The Weepah mine in Nevada produced about 2,000 ounces of gold a month. The property was mined out during the year.

Sunshine received a medallion commemorating its 50th anniversary of being listed on the New York Stock Exchange. The company is one of fewer than 200 of the over 1,600 listed companies to have survived 50 years on the exchange.

Sunshine started sales of its new Golden Eagle coins early in the year. The coins come in one, 1/2, 1/4, and 1/10 ounce denominations and are produced at the company's mint in Coeur d'Alene.

Other Producing Metal Mines (Figure 2)

Cyprus Minerals Company

Cyprus Minerals maintained operations all year but continued to scale back in the face of low molybdenum prices. In February, the company purchased Metec, Inc., a producer of specialty molybdenum products in New Jersey. Production plans for the year from Thompson Creek were reduced in February from 9 million pounds to 7 1/2 million pounds of moly. At the time, the mine employed 350 people. The lowered production target meant that the mine was operating at only 40 percent of capacity. The mine yielded 15 million pounds of Molybdenum in 1986.

Last year Cyprus purchased the Sierrita copper/molybdenum mine in Arizona from Duval(?). The mine has a moly roaster and can produce enough moly to cover Cyprus's current contracts. When the company laid off 110 workers at Thompson Creek in November, eighty were transferred to Sierrita. Cyprus ranks second in domestic moly production and third in the world. The company purchased the Casa Grande (Lakeshore) copper mine in Arizona from Noranda this year.

Cyprus asked for and received reduced power rates for the mine and mill from Bonneville Power Authority. Lower rates could help the mine stay open. The mine is BPA's largest customer in Idaho. Cyprus also asked the Federal government to end duty-free imports of moly from Mexico and Chile.

The price of the metal fell to below \$2.70 in July. The price was \$8 per pound when the mine opened in 1981. There was more bad news in September when another 150 workers were laid off at the mine due to increased production at Sierrita, leaving only 136 workers at Thompson Creek. The company offered the laidoff workers jobs elsewhere. Production was again scaled back to a rate of 3.5 million pounds of moly metal a year.

NERCO Minerals Company

NERCO continued with full production at the DeLamar mine. Construction started on a \$2 1/2 million heap leach plant for processing 2 to 3 million tons of low grade ore that has been stockpiled at the mine. The pad will eventually measure 2 million square-feet with the first module being

750,000 square feet. The project should be completed in December. The plant will use the Merrill Crowe process. Plans call for processing about one million tons of ore per year for seven years. Recovery for the seven-year period is estimated at 1.4-million ounces of silver and 65,000 ounces of gold. The pads will be heaped with continuous 20-foot lifts to a final depth of 125 feet. The 190 acre leach pad site is underlain by a thick, natural clay layer that reduces costs and ensures environmental safety at the site. Water for the operation will be recycled from the mine's tailings pond.

A new technique for controlling acid mine-waste drainage and improving water quality is being successfully tested at Delamar. The process uses a material called ProMac developed by the B.F. Goodrich Company. ProMac inhibits the growth of acid-producing bacteria thereby reducing acid drainage from 15 acres of waste rock at the mine site. The material is spread using hydro-seeding equipment and covered with a thin layer of soil to promote plant growth. The process has been successfully used in coal mines but the Delamar experiment is the first test of ProMac at a metals mine. ProMac is registered with the Environmental Protection Agency.

Production at DeLamar was normal, with about 1.7 million ounces of silver and 28,000 ounces of gold produced in the closed counter-current decantation leach plant. Ore was mined from the North Delamar pit (now mined out). Production from the Glen Silver pit will start soon. Ore grade at the mine averages 1.40 ounces of silver and .018 ounces of gold per ton. Production costs in 1986 were \$233 per ounce for gold and \$3.43 per ounce for silver. The mine employs about 150 people.

Pioneer Metals

Pioneer Metals continued work at the Stibnite heap-leach gold mine. The company mines about 8,000-tons per day from the West End deposit. The ore is crushed to -1.25 inch and heaped on five 50,000-ton pads. The mine only operates 8 months a year due to the severe winters in this part of Idaho. Gilbert Construction Company has the mining contract and employs about 70 people at the mine, whereas Pioneer has 20 employees. The ore averages .05 ounces of gold per ton. Pioneer produced 36,500 ounces of gold and 22,400 ounces of silver at Stibnite in 1987. Production from the West End pit will end this year and next year's production will come from the Garnet Creek and Southwest extension ore bodies.

Coeur d'Alene Mines Corporation (Thunder Mountain)

The Thunder Mountain heap-leach gold mine, owned by Thunder Mountain Gold and operated by Coeur d'Alene Mines Corporation, reached full production this year, yielding about 27,000 ounces of gold. The Pacific Northwest Pollution Control Association presented an award to Cda Mines for its environmental record at the mine.

U.S. Antimony Corporation (USAC)

USAC expanded operations this year in east-central Idaho by custom milling for several other small mining companies. The company also fed its 350 ton-per-day plant at Preacher's Cove on the Yankee Fork of the Salmon River from its mine on Estes Mountain and from the Custer slide. USAC acquired a 50 percent interest in the Yellowjacket mine located 110 miles from the mill. Ore grades from three test runs from the Yellowjacket open pit averaged .025 ounces of gold per ton. The mineralized zone is about 1,200 feet long and 500 feet wide. Mining continued from the Valley Creek mine near Stanley, Idaho. Two new veins were found in mid-year that averaged .25 ounces of gold per ton. Some ore was custom milled for Atlantis Mining and Manufacturing Company.

Clayton Silver Mines

The Clayton Silver mine remained closed all year. The mine is almost completely flooded from the 1100 level to the surface. The company did mill several small batches of ore from Metron Resources and Silver Bar Mines, and is looking for some more custom work.

Silver King Mines

The Mine Safety and Health Administration (MSHA) noted that 14 men were working at the Copper Cliff mill owned by Silver King Mines near Cuprum in Adams County.

Placer Mines

A and T Mining operated the largest gold placer in the state at Sherwin Bar on the main Salmon River. The company employed 8 men on the seasonal operation.

Cocal Mining employed three men on the Tenant #1 placer mine near Lucille.

Roeder Mining, Inc., employed three men at the Golden Chariot placer mine in Elmore County. Other companies working in Idaho according to the Mine Safety and Health Administration (MSHA) included:

<u>Company</u>	<u>Mine Name</u>	<u>County</u>	<u>No. Employed</u>
<i>Carlin Bros. Min.</i>	<i>S. Africa No. 1</i>	Boise	2
<i>Gold Express Corp.</i>	<i>Gold Express</i>	Lemhi	1
<i>Heritage Mines</i>	<i>Heritage mine</i>	Valley	5
<i>Solomon Min. Co.</i>	<i>Princess Blue Ribbon</i>	Camas	2

<i>CSC Mining Co.</i>	<i>Gold Duck</i>	Shoshone	2
<i>T.J.Lindsey</i>	<i>Wildcat</i>	Idaho	1
<i>Vienna Int. Ltd.</i>	<i>Vienna Int.</i>	Shoshone	4
<i>Silver Butte Min. Co.</i>	<i>Brown Bear</i>	Bonner	3
<i>Nordstrom Placer Min.</i>	<i>Butte Gulch placer</i>	Shoshone	4
<i>Eagle Creek Mining</i>	<i>Camp Creek Placer</i>	Shoshone	4
<i>Vaux Mining Co.</i>	<i>Vaux mine</i>	Idaho	2
<i>Pugh Bros. Const.</i>	<i>Eagle Silver</i>	Benewah	8
<i>Amer. Gold Res.</i>	<i>Arnett Cr. Placer</i>	Lemhi	2
<i>Central Min. Co.</i>	<i>Central mine</i>	Shoshone	3

Phosphate Operations (Figures 2 and 4)

Introduction

FMC and Monsanto received good news in May when the U.S. Department of Commerce issued a preliminary ruling stating that Belgian and Israeli companies were dumping phosphoric acid in the United States at below cost. The Department ordered the Customs Service to require a cash deposit or bond on all future imports. These anti-dumping duties are in addition to duties imposed in January to offset "benefits which constitute subsidies".

FMC Corporation

FMC employs about 500 workers at the largest elemental phosphorous plant in the world at Pocatello. The company completed the second year of a \$13 million program to meet EPA air quality standards. The work included installing efficient scrubbers on the four stacks on its two calcining plants. Scrubbers were installed on one plant's stacks last year and the installation on the second calciner will be completed next year.

Negotiations with the Shoshone Bannock tribe were completed late last year for a 2,300 acre major expansion of the Gay mine called the South 40 extension. A drilling program this year gave disappointing results. Beds in the Phosphoria Formation on the extension are vertical rather than

being more gently tilted and therefore reserves are deeper, more expensive to mine, and lower quantity than anticipated. Without new reserves, mining from the Gay will slow within five years. J.R. Simplot has asked the tribe and the Bureau of Indian Affairs for permission to begin drilling for new reserves on the rest of the reservation. The big mine is on the Fort Hall Indian Reservation and was placed in operation in 1946. Mining this year began at the Gay mine extension area No.1 and continued from two pits in the old lease. The company is tearing out the old ore tipple at the Gay and installing a new one at a cost of about \$1.3 million.

Partial remains of several Mastodons were found in two separate sites at the Gay mine during the year. Students from Idaho State University were excavating, preserving and cataloging the find. The bones, including a full set of tusks, will eventually be displayed at the Shoshone-Bannock tribe's museum.

Monsanto Company

Monsanto finished installing scrubbers at its elemental phosphorous plant near Soda Springs, which will greatly reduce air pollution from the plant. Monsanto has recently invested about \$12 million in pollution control equipment including the scrubbers.

The company uses about one million tons of phosphate ore per year to feed its Soda Springs plant. The ore is mined from the company's Henry mine. Dravo-Soda Springs is the mining contractor and employs about 100 people at the mine. The plant employs about 400 workers. Quartzite used for slag in the elemental phosphorous process is mined from the company's quarry by the Washington Construction Company.

Kerr-McGee Corporation

Kerr-McGee's plant at Soda Springs recovers vanadium from ferrophosphorous slag, a by-product of Monsanto's elemental phosphorous operation. The plant began operation in 1963 and is the largest producer of vanadium in the United States. The company announced plans for a major plant expansion in March but the plans are on hold, as the company is having trouble finding new sources of vanadium. It uses all of Monsanto's slag and would like to obtain more. The expanding market for vanadium is in part, due to demand for new products developed by Kerr-McGee. These include ammonium vanadate, used in catalysts and in ceramics; fused flake, used in steel making; fine-granular vanadium pentoxide, used in ceramics and catalysts; low-alkali fine-grained vanadium pentoxide used in making maleic anhydride; Savan, used in the Stretford process to remove H₂S from refinery emissions, and K-Van, a potassium vanadate used in acid catalysts. About 50 people are employed at the plant.

Figure 4 near here

Kerr McGee received OSHA's STAR award for its voluntary commitment to health management and worker safety. The company is the first recipient of the award in the northwest. There were only 49 such awards given out to the 5 million work sites considered for the honor.

Nu-West Industries, Inc. (Beker Industries)

Idaho received good news in July, when it was announced that Beker Industries' Conda mine and fertilizer plant had been sold to Nu-West Industries for \$50 million. Nu-West is a consortium formed by Weiss, Peck and Greer, a New York based investment company; and Cleav McCarty, president of the Permian Chemical Company. The plant had been closed since May of last year (with the loss of some 400 jobs), when Beker declared Chapter 11 bankruptcy.

The deal also included Beker's 50 percent interest in the Conda Partnership, a joint venture with Western Cooperative Fertilizer Corporation of Alberta, Canada. The Partnership operated phosphate mines in Dry Valley and a calcining plant located next to Beker's acid plant. The phosphate ore mined by the partnership is split with half going to Beker's plant and half shipped to Western Cooperative's plant in Canada. At year's end, no phosphate had been shipped to Canada.

In July, more than 1,000 people filed applications for the estimated 240 positions needed at the acid plant and calciner. The plant was back in operation by September 1. At year's end the plant employed 150 workers, the calciner 35, and the mining operation 100. Conda Mining, Inc., (an affiliate of the Washington Construction Company) is the mining contractor. The acid plant will operate at 50-70 percent of capacity with annual production of about 200,000 tons of fertilizer. The company mined about 760,000 tons in 1987 from the Mountain Fuels lease in Dry Valley and hopes to mine about 1.5 million tons next year. The plant is one of the largest producers of super-phosphoric acid in the country.

Nu-West became concerned for the future of the operation in November, when a deal with the federal government for low cost natural gas hit a snag. Nu-West wants the same price as that paid by its chief competitor in the area, the J. R. Simplot Company, who operates an acid plant in Pocatello.

J.R. Simplot Company

Simplot installed a wet scrubbing system on the No.3 calciner at its acid plant in Pocatello in June at a cost of \$350,000. The unit replaces an electrostatic precipitator. The scrubber was moved from a calciner at Conda that is no longer in service. The scrubber will help the company comply with EPA and state clean air standards. In addition, Simplot is spending \$1.5 million to relocate an AMSOX scrubber that was installed in 1976 on two older acid plants, to one of the company's two new and larger plants completed last year. The AMSOX scrubber removes sulfur dioxide and sulfuric acid mist and the scrubber on the calciner removes particulate material from the air.

Production at the Smoky Canyon was reduced to 750,000 tons for the year. The work force was reduced to one shift at the mine due to a tight agricultural fertilizer market. The company also mines about 2 million tons of ore from the Gay mine, leased by Simplot and FMC and operated by Simplot on the Fort Hall Indian Reservation. About 85 percent of the ore from the Gay goes to FMC and the rest to Simplot. About 450 people are employed at the Pocatello plant, 25 at the Conda transfer plant, 100 at the Smoky Canyon mine, and another 160 at the Gay mine.

Stauffer Chemical Corporation

Stauffer Chemical mined about 300,000 tons of phosphate ore from the Woolly Valley mine and shipped about 260,000 tons to its elemental phosphorous plant at Silver Bow, Montana. The company employs about 30 people in mining. Stauffer has changed hands a number of times recently and this trend continued during 1987. The company was owned early in the year by Unilever Corporation who acquired Stauffer when it took over Chesebrough-Ponds in 1985. Unilever then sold Stauffer to Imperial Chemical, who late this year, sold the company to a major French chemical company, Rhone-Poulenc.

N.A. Degerstrom

N.A. Degerstrom continued to refine a process for extracting silver and gallium from treater dust that is a by-product of the elemental phosphorous plants in southeast Idaho. The company reportedly has an agreement with Monsanto for the product, if and when silver prices make the process economic.

Industrial Minerals (Figure 5)

Figure 5 near here

Limestone

Acme Concrete of Spokane obtained a zoning change on a 200 acre tract south of Rathdrum. The company may build a gravel and concrete batch plant at the site that could employ 75-100 people. Acme is evaluating the market in northern Idaho and in the Spokane area.

Ash Grove Cement, the only cement manufacturer in the state, decreased production slightly from last year. Finished portland cement was used by ready-mixed concrete companies (70%), other contractors (11%), highway contractors (5%), building material dealers, miscellaneous customers, and government agencies. Ash Grove's two-kiln, wet process plant uses natural gas and bituminous coal for fuel. Raw materials used for making cement include locally mined limestone and quartzite; gypsum and iron ore were shipped in from outside the state.

Silica

Unimin Corporation is the only silica producer in the state. The company mines sand deposited in Lake Idaho, a Pliocene lake that disappeared long ago. The sand pits are located on Freezeout Hill near Emmett. The sand is used for bottle making, sandblasting, as a filtration medium, in fiberglass manufacture and for roofing granules.

Diatomite

American Diatomite Company continued to evaluate its diatomite deposit located 13 miles north of Bliss. The company plans on mining 75,000 tons of diatomite when operations begin. The mine site is adjacent to the Gooding City of Rocks wilderness area and is a concern to environmentalists. The company wants to widen an 8-mile-long road to the mine site to handle the 8 forty-foot dump trucks it plans to use at the operation.

Perlite

Oglebay Norton refurbished the mill (added a third crusher) and processing plant (built a new loading facility) at the perlite plant in Malad purchased this year from *Oneida Perlite*. The company plans on further improvements and will ship both expanded and crude perlite and pumice under the *National Perlite Products Company* label. The perlite is mined from an open pit located north of Malad. Most of the material is used as a filtering aid, for fireproofing, and for light-weight aggregate. Oglebay Norton is a very large industrial rock and minerals company with worldwide operations. The company employs about 24 people at Malad.

Pumice

Hess Pumice maintained full production from its new \$1.2 million plant at Malad. The company specializes in fine ground pumice that is used as a polishing medium for such products as television tubes and printed circuit boards. Pumice is also sold as an abrasive, for making stone-washed blue jeans and as a lightweight aggregate. Hess shipped about 17,000 tons this year and employs an average of 20 people. The pumice is mined from the *Wrights Creek mine* located 22-miles north of Malad.

Producers Pumice was the second largest pumice operation in Idaho following Hess Pumice. The company mines pumice for lightweight aggregate from the *Rock Hollow mine* near Ammon .

Amcor Inc. mined pumice from the *Fan Creek claims* near Idaho Falls. The material is used for manufacturing lightweight concrete blocks.

Garnet

Emerald Creek Garnet maintained full operations at Fernwood. The company is the largest producer of garnet in the United States. Nearly 23,000 tons of finished garnet product were shipped from the plant. The company built a new jig plant and will refurbish the mill next year. About 34 people were employed at the operation. Garnet is dredged from Emerald and Carpenter Creeks, separated from other minerals in the jig plant, and dried, crushed, sized, and packaged at the mill. The operation is the largest placer operation in Idaho and the company is justifiably proud of its reclamation efforts. Garnet is used as a filtering medium and as an abrasive. About 25% of the garnet is exported.

The U.S. Forest Service star garnet digging operation near Fernwood continued to be popular with rock hounds and tourists. There were 1,027 permits issued to dig for the state gem and another 640 visitors dug at the site.

Clay

A.P. Greene a subsidiary of U.S. Gypsum will be spun off as a separate entity in January, 1988. A.P. Greene operates a refractory brick plant at Troy. Clay for the bricks is mined from pits near Helmer. The company made inroads in the aluminum industry and was shipping brick for refineries near Portland but a downturn in the industry ended that contract this year. Most of the brick was used by Stauffer Chemical Companies elemental phosphorous plant at Silver Bow, Montana, and by the wood products industries. The company employed 13 people at the Troy plant this year.

Clayburn Industries shipped calcined clay from the old Simplot pits near Helmer to its refractory plant at Abbotsford, British Columbia. The pits and processing plant are leased from Simplot.

Scoria

Lava flow Productions Inc., enjoyed a good year expanding into 35 states and Canada. The company, formed in 1982, did \$1.5 million in business this year, up from \$11,000 three years ago. The company mines volcanic scoria from state leases near Mountain Home. The scoria is used as briquets in gas barbecue grills, as aquarium gravel, and for landscaping. The company employs 60 people.

Gemstones

The "Star of America" sapphire purchased last year at the Tucson Mineral show and touted to be worth \$2.28 million has been judged to be an insignificant stone worth little. The specimen, purchased for \$10, was supposedly from somewhere in Idaho and created a stir among rock hounds.

Aluminum Recycling

Kaiser Aluminum may open a recycling aluminum smelter somewhere in north Idaho.

EXPLORATION (Figure 6)

Coeur d'Alene District

In August, *Callahan Mining Company* started a new \$4 million exploration phase began at the Caladay project. The Caladay shaft is located just east of the Galena mine. The program calls for 2,600 feet of drifting and 6,900 feet of diamond drilling. The drift on the 4900 level will eventually connect to the Galena lower workings and will be extended 1,020 feet towards the Boundary Vein. A second drift, 800 feet long, will go southwest of the Caladay shaft to intercept the Killbuck fault. Two, 2,000 foot-long diamond drill holes from this drift will explore the Silver Standard fault. The initial program at the Caladay cost \$26.6 million, including \$21 million for the 5,000 foot shaft and \$5.6 for drilling and drifting.

Trans Atlantic Pacific Inc. (TAP Resources) optioned the 111 Vik claims near Murray. Tap also has an agreement with *Golden Chest, Inc.* that holds a long term lease on the *Golden Chest mine*, a former gold producer. Tap controlled over 3,600 acres in the vicinity of the old Golden Chest mine by mid-year. The company signed an agreement with *Newmont* in August. Newmont plans on drilling three holes on the property this Fall, looking for a lowgrade deposit. The president of Tap is John Beasley, former tight end for the Minnesota Vikings. Tap is a natural resources management company in California. Mr. Beasley resigned as Chairman of Golden Chest, Inc. in October, to lead a proxy fight to oust other officers from the company.

Figure 6 near here

Cominco drilled a hole just north of the *Golden Chest mine* in the Murray area.

Teck Resources finished a deep navi-drill hole at the *Gem State-Rock Creek* property. The 5,000 foot-deep hole probed the Blue Jay mineralized zone. The mile-long Gem State tunnel driven by Hecla in the 1940's was reopened by Teck in the first phase of the project in 1984.

The City of Wallace approved a mineral lease agreement with *Wallace Silver, Inc.* The company now controls 80 percent of the subsurface mineral rights under Wallace and is trying to interest a major mining company in the property.

Soil sampling at the *Wake Up Jim mine* owned by *Sundance Mining-Development Company* was encouraging.

The *Sierra Silver mine* tour had 12,218 visitors in 1987 compared to 11,846 the previous year.

Other North Idaho

Merger Mines Inc., extended the drift at *Cedar Mountain* (located at the south end of the Pend Oreille district) from 500 feet to 1,200 feet. A vein was crosscut at 1,000 feet and some lead/silver mineralization was discovered. This vein was the target of the venture that started two years ago and will be explored by a drift next season.

Shoshone Silver Mining drove a 500 foot long tunnel at the *Idaho Lakeview claims* looking for a mineralized target found by drilling. The company has a 98 percent interest in the *Keep Cool group* and a 100-percent interest in the *Weber and Weil (Drumheller)* group.

The No. 3 crosscut at the *Iron Mask mine* was extended to the 2000 station. Two diamond drill holes were drilled from this station and a crew worked on a raise from the station. The raise was 225 feet high and had 170 feet to go to intersect a drill target that assayed 25 ounces of silver to the ton. The work is being done by the *Iron Mask Mining Company*.

Silver Crystal Mines, Inc., actively explored its 4,700 acres of newly acquired claims located at the *Umatilla mine* west of Orogrande. The Umatilla tunnel was cleaned out, new rails laid, and a new drift started 630 feet from the tunnel portal. The property is being developed for gold and *platinum*. Grab samples from the new drift reportedly assay .31 ounces of gold and one ounce of platinum group elements per ton. Platinum was supposedly discovered on the property in 1980. Silver Crystal is working with *Idaho Mining and Development Company* and *Idaho Platinum Resources Inc.* to build a pilot wet-chemical extraction plant. Platinum mineralization has also been found in a 50- to 75-foot-wide ultramafic dike located about 3,000 feet from the mine. The Umatilla mine is in a roof pendant and has 150 feet of workings in what is described as a peridotite. Minerals reportedly include pyrrhotite, pentlandite and chalcopyrite.

Alotta Resources (affiliate of *Tundra Gold Mines*) drilled about 75 reverse circulation holes near the *Col. Sellers mine* north of Elk City. Late in the year, *Billiton Minerals* joint ventured the Tundra holdings and can earn a 100 percent interest in the project by investing \$50,000 by March 1988, \$250,000 by the end of 1988, and another \$1.5 million by the end of 1989. If the property goes into production, Alotta will receive 40 percent of net profits after Billiton recovers its investment. Drilling continued late in the year. The *Mineral Zone* project has combined estimated reserves of 1.95 million tons of .055 ounces of gold per ton. Billiton also has a claim block extending south from Orogrande to the headwaters of Crooked River.

Gold Dust Mining employed two men worked at the *Gold Dust No. 2 mine* in Latah County.

Glamis Gold and *Amir mines* constructed and tested a pilot heap-leach pad at the *Buffalo Gulch* property northwest of Elk City. The deposit contains six million tons of .03 gold. South of Buffalo Gulch, *Amir* and *Normine Resources* hold the Friday claim group that contains 3 million tons of .04 gold. Glamis can earn a 51 percent stake in both properties by bringing them into production. The

companies control a 17-mile strip of favorable land. The ore at Buffalo Gulch reportedly contains considerable clay and may have to be agglomerated.

NeveX Gold Company obtained a 60 percent interest in the *Majestic project* (owned by *Mines Management Inc.*) near Dixie. The *Majestic* is next to *NeveX's Robinson Dyke* project. The company cleared the *Robinson Dyke* area and plans to develop a heap-leach operation at the site next year. Plans call for processing 620,000 tons of ore at a grade of .4 ounces of gold per ton, and moving 450,000 tons of waste. Late in the year, *NeveX* and *Canyon Resources Corporation* agreed to a merger, with *Canyon* the successor company.

E and E Exploration drilled on an extensive claim block in the Florence Basin. Plans call for a heap-leach operation and some column testing was done this year.

Cominco drilled a single hole on *Lightning Creek* north of *Clark Fork*. More work is planned for next year.

Cominco examined three properties in the *St. Joe* area, including drilling programs at *Granite Peak* and *Moore's Saddle*. No new holes were drilled at the *Crescendo Peak-Blackdome* property that was looked at last year, but the company is maintaining its claims.

Salmon Area

Merger Mines, Inc., had three men opening an adit at its *Cyanide Gulch* property near *Gibbonsville*. The target is a series of east-west trending quartz veins carrying precious and base metals that are typical of this area. The company also did some work at the *Twin Brothers mine* south of *Gibbonsville* that is owned by *Gibbonsville Premier Gold Mine Ltd.*

Eagle Claw Mining Company completed a 400-foot long drift at the old *Clara Morris mine* near *Gibbonsville*. The entire drift is timbered and is in very heavy ground. The company is looking at other ways to reach a known ore zone. A total of nine men worked on two shifts on the project. The company has invested about \$400,000 in the property.

Canyon Resources drilled a new property located three miles north of *Leesburg*. The company will continue to evaluate the site next year.

Amselco reportedly was doing evaluation work on *Arnett Creek*.

Metron Resources shipped 4,600 tons of ore to *Clayton Silver* for mill testing. The mine is located on *Porphyry Ridge* south of the *Blackbird* mine in *Lemhi County*. A drilling program was conducted during the year. *Metron* is part of the *Vancouver Development Group* and is joint venturing the *Porphyry Ridge* property with *McConnell-Peel Resources Ltd.*

FMC is still drilling at *Ditch Creek* and expanded their claim block. The target is reportedly lode deposits located below placer gravels. The creek was placered in the early 1900's.

Noranda conducted a drilling program at the old *Kittie Burton* and *Ulysses* mines on patented ground in the Indian Creek District. These claims were drilled last year by *Tenneco Minerals*. The *West Fork Gold Mining Company* also drilled on the West Fork of Indian Creek.

Northwest Minerals did 1,500 feet of trenching on the *Wagonhammer* claims near Gibbonsville. Plans call for drilling 10 holes late in 1987.

Some underground development and core drilling was completed at the *Monitor* mine on Owl Creek, north and west of Shoup.

FMC Corporation drilled 11, 600-foot holes on *Freeman Creek*. A lease on the property was obtained from St. Joe Minerals. St. Joe was purchased by Dallhold Investments Pty., part of the Bond Corporation of Australia, for \$500 million.

Idaho Energy Resources sampled the thorium resource near Lemhi Pass.

Pegasus has acquired a claim block in the *Buffalo Hump* district. Several holes were drilled this year in the vicinity of the *Big Buffalo* mine.

West-Central Idaho

Art Peterson operated his small mine on Bear Creek in the Marshall Lakes area. Ore from the mine is processed in a stamp mill in Riggins.

Summit Silver continued work at the *Kimberly* mine in the Marshall Lakes district. The company plans an underground drilling program next year.

Amselco expanded its claim block at the *Golden Gate Tungsten* mine to include Antimony Camp and more of Antimony Ridge. The property is located east of Johnson Creek and just south of Yellowpine. The company drilled 44 holes on the property this year. The target is a mineralized shear zone that extends down Johnson Creek and may eventually merge with the Deadwood Fault zone. The company drilled the area as a precious metal target and not for tungsten or antimony. *Meridian Minerals* is a joint venture partner with *Amselco*. *Amselco Minerals Inc.* and *Kennecott Corporation* were merged into B.P Minerals America by the company's parent, the British Petroleum Company, which gained control of Standard Oil of Ohio, Kennecott's former parent, this year. B.P. purchased the 45 percent of Sohio it did not already own for \$7.4 billion.

The adit at the old *Crystal* mine just north of War Eagle Mountain near Warren was opened and lengthened.

Four men were working on the *Rescue mine* joint venture at the old Rescue mine near Warren.

The *Heritage Mining Company* operated a small one ton per day mine at their property near the *Werdenoff mine*.

An adit was driven by *American Independence Mines* (Jack Walker) at the *Antimony Rainbow mine* on Big Creek. The property was drilled last year.

High Country Mining Corporation drilled the KT and DC claims on Quartz Creek, at the Goldman cut near Elk Summit, north of Yellowpine.

Hecla Mining Company is studying the possibility of starting a major gold mine at the *Homestake* ore body near the old pit at Stibnite. The company inherited the mine during the merger with *Rancher's Exploration* in 1984. The orebody contains reported reserves of 800,000 tons of .10 ounces of gold per ton.

The *Lost Packer Mining Company* did development and exploration work at the Lost Packer mine in Custer County. Plans called for shipping some ore from the Lost Packer to U.S. Antimony Corporation's mill on the Yankee Fork.

Dave Ogren was rebuilding the bridge across Rapid River to the Black Jack claims in the Seafoam district.

Yanke Machine Company extended the drift at the *Greyhound mine* from 1,167 feet to 1,411 feet. A three compartment raise was started on a new ore shoot discovered at the end of the drift. Ore from the new shoot assays 20 ounces of silver, 3-4 percent zinc, 1.5 percent lead, .05 to .07 ounces of gold and trace arsenic. Ten, 30-ton test batches of ore were run through the Greyhound mill. The mill will be upgraded and a drilling program started next year.

Tundra Gold drilled a target on Miller Mountain north of Lowman.

Orsina Resources explored its nine claims in the *Packer John Group*. The company raised \$530,000 last year to buy the claims and finance exploration.

East-Central Idaho

Sunbeam Mining Corporation hopes to get final approval from EPA to go ahead with development of a 800 ton-per-day vat leach plant at the old Sunbeam mine on Jordan Creek in Custer County. Production is estimated at 40-50,000 ounces of gold per year over a 10 year period. The mine will employ about 80-90 people. The mill will run year round but mining will stop for two months during the Spring runoff to avoid environmental problems. Sunbeam has been in the permitting process for three years. The company is a wholly owned subsidiary of *Geodome Resources Ltd* of Toronto, Canada. Development is scheduled to start as soon as the EPA permits are acquired.

Shama Minerals Chemical and Oil, Inc., increased its claim block in Idaho from 1,700 claims held last year to over 4,200 claims. The company has also applied for oil and gas leases on many of these claims. The president of the company believes God has a plan for this area and he uses divine guidance in staking and exploration. The company has operated a fluorspar mine and mill near Challis on and off since 1974. Shama drilled four holes this year. The deepest hole was near the Bayhorse district and went down some 3,700 feet.

Richweld Resources Ltd. announced the completion of a diamond drilling program at the *Blackstone mine* in Elmore County. A number of mineralized zones were found outside of the old open pit at the mine site. Deeper drilling was planned for this Fall. The company is considering building a mill in Fairfield.

Some ore was shipped from the *Black mine* on the Yankee Fork by the *M and S Mining Company* (Floyd Marshall).

Silver Bar Mines shipped several loads of stockpiled ore from the *King of the West mine* to Clayton Silver and to Jarbidge, Nevada, for processing.

Glamis Gold acquired the *Champagne mine* lease from Goldfields. The company reportedly paid Goldfields \$1.6 million for the property that was drilled last year (26 holes by Goldfields). Values supposedly ran as high as .25 ounce-per-ton gold but were sporadic.

Galli Exploration continued a drilling program at *Rocky Bar*. This year about 20 holes were drilled in a mineralized shear zone on the Rinebold claims located in Hardscrabble Gulch. Galli was spun off by *Royal Apex Silver* (now part of Coeur d'Alene Mines Corporation) as a separate company and is now called *GEXA Gold Corporation*.

Rumors are that the *Hill Top mine* near Leadore may be reopening.

An exploration program at the *Vienna mine* was successful and *Rothchild's Corporation* will start mining next Spring. The ore will be processed in Rothchild's 350 ton-per-day mill on Warm Springs road near Ketchum.

Homestake Mining obtained a lease on the *Bartlett Point* property located west of Chilly Buttes in Custer County. Six holes had been drilled on jasperoids by year's end, with disappointing results.

Atlantis Mining Company continued development at the Atlantis mine in Colorado Gulch near Bellevue. The company completed 700-800 feet of underground development, including three raises and one stope. A drift is about 50 feet from the Magdalena vein system which carries gold and other metals. Atlantis shipped 525 tons of ore to U.S. Antimony's mill on the Yankee Fork. The company completed a new bridge across the Big Wood River that will expedite ore shipments and access to the mine. Atlantis is considering building its own \$1.1 million mill near Bellevue.

There was some activity reported at the *Democrat mine* in Lemhi County. Three men worked at the minesite during the summer season.

Boise Basin

Billiton Exploration drilled a target in the Illinois shear zone in the Gambrinius district located north of Idaho City.

Frontino Corporation continued its exploration program at the *Ophir mine* near Idaho City. Roads were built and drill pads cleared for a drilling program scheduled for next year.

Southeast Idaho

Noranda Exploration obtained the *Black Pine* property in Cassia County from *Permian Exploration*. The Tallman open-pit mine in the district produced 15,000 ounces of gold from a vat leach plant in the 1950's. Noranda has completed 37,000 feet of reverse circulation drilling and has discovered two additional ore bodies in the area. All three zones (the A, B and Tallman) are on strike and average 50-100 feet thick. Reserves were reported in mid-year at 5.6 million tons of .05 gold.

Oglebay Norton, new owners of the *Oneida Perlite* operation at Malad, drilled east of the perlite deposit on the west side of Elkhorn Mountain for base and precious metals.

Antilles Resources (Exvenco) drilled four holes this year in Robber's Gulch. A total of eight holes have been drilled so far, each about 350 to 400 feet deep. The target is gold-bearing quartz veins and jasperoids along extensive northwest-trending fault zones in Permian and Pennsylvanian sediments of the Oquirrh Formation.

American Copper and Nickel Company, Inc., drilled 10 holes on its extensive claim block south of Antilles Resources in Cassia County.

Meridian Minerals Company drilled south of Oakley near Middle Mountain. About 11 new holes were put down.

Meridian Minerals did more drilling at the *Mink Creek-Scout Mountain* area, south of Pocatello, that was discovered last year. The target is jasperoids in Paleozoic rocks. The results of the drill program are being evaluated.

Meridian continued their program at *Middle Mountain*, south of Oakley. There are two areas of interest, the Cold Creek zone (in rocks of the Idavada Volcanics) and the Blue Hill zone (that contains a fossil sinter). Both zones are on a northwest trending structure.

Freeport Minerals drilled an epithermal target at Malad Summit. Results were being evaluated at year's end.

Freeport also tied up the claims on *Caribou Mountain* in Bear Lake County. The property will be explored next year.

Chevron drilled 5 or 6 holes on claims north of Craters of the Moon National Monument. This is the property drilled by *Manville Sales* in 1984. *Chevron* has taken over *Manville's* claims in Idaho and elsewhere.

Cominco explored in Long Canyon north of *Chevron* and near where *Billiton* drilled last year (but on a different property). The company will consider a drilling program next year.

Southwest Idaho

ICAN Minerals drilled 36 holes, for a total of 540 holes completed at the *Almaden mercury mine* near Weiser. The company has about 25 million tons of .028 to .03 ounce per ton gold blocked out. *ICAN* is mill testing the ore, which is difficult to leach because of extensive silicification. The company would like to operate a heap-leach plant with a recovery of 55 percent. *Granges Exploration* signed an option agreement with *ICAN Minerals Ltd.* on the property. A 10,000-ton pilot heap-leach test is planned at the mine site.

The old *Lincoln mine* in the Pearl-Horseshoe Bend district was leased by *Union-Eagle Resources, Inc.*, from *Western Centennials Inc.* The company is negotiating with *Morrison-Knudsen* for a preliminary feasibility study of the property.

Chevron Resources drilled nine holes near Haystack Peak, at the Thirsty Mountain prospect located due north of Weiser. This is a low grade gold-mercury show similar to the *Almaden mine*.

An inclined shaft was being driven by *J and D Lode and Placer* at the *Competence mine* in the *Neal district* in Elmore County. The company is looking for an extension of mineralized shear zones mined early in the century.

The *War Eagle Mining Company* (Vancouver, B.C.) drilled nine reverse circulation holes on a large land holding on *War Eagle Mountain* located near Silver City in Owyhee County. The holes varied in depth from 300 to 500 feet. The company has control of the *Ida Elmore, Golden Chariot, Cumberland, Mahogany, Central, Orofino, Poorman, Keystone, War Eagle,* and other claim blocks in the area. Drilling followed geochemical and geophysical surveys completed last year.

Yanke Machine purchased the *Golden Rule mine* on *Blacks's Creek* and will drill the property this winter. The mine has a past history of gold production.

Other Mining Related News

Rules and regulations governing mining operations using cyanide will be enacted by the State of Idaho in December. A task force composed of industry, state government, and environmental groups hammered out the proposed regulations that are the first of their kind in the United States. Many other states are expected to use the Idaho rules as a model to write their own laws. The new regulations are strict but fair, and are designed to safeguard against accidents when using cyanide, especially in heap-leach operations.

The town of Cobalt was auctioned in August. Cobalt was home for miners who worked at the Blackbird mine in the late 1950's. The town was built by the Calera Mining Company and had a population of over 450 in its heyday. Noranda purchased the town and mine in 1980 when cobalt prices were in the \$25 per pound range. The company invested \$30 million in refurbishing the mine and mill and the town. Cobalt prices plummeted in 1981 and the operation shut down the next year before any ore was mined. Purchasers of the town's buildings have until next July to remove them from the site, which will revert to a sagebrush covered flat.

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