

IDAHO MINING AND EXPLORATION, 2004
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Idaho Geological Survey

Company reports of better times and higher prices in 2004 were confirmed by the preliminary nonfuel minerals production data compiled by the U.S. Geological Survey. The preliminary value of Idaho's 2004 mine production was \$ 322 million, a sizeable jump from the 2003 final USGS annual value of \$ 269 million (Figure 1). Idaho's output is balanced among several commodities, though phosphate mining accounts for the largest segment of the industry; the value of in-state phosphate processing is estimated at an additional \$ 300 million. Nationally, Idaho ranked third in silver and phosphate rock production and was one of only two states to produce garnets. In terms of value, phosphate rock ranked first, followed by construction sand and gravel, molybdenum concentrates, and silver.

Higher commodity prices were largely responsible for the increased value, although a few commodities did have an increase in amount. Significant rises in silver, gold, base metals and molybdenum prices are easy to track and should have led to a higher percentage of value being derived from the metals sector, but a tally of the preliminary data shows that in 2004, the proportion of value due to metals continued to decline, dropping to 28.81% in 2004 (preliminary) from 29.46% in 2003 and 29.32% in 2002. This reflects improved prices and demand for industrial minerals such as aggregate and phosphate rock, along with a major upswing in perlite mining. Silver, one of Idaho's signature commodities, traded below \$ 5 per troy ounce (London fixed price, www.kitco.com) for most of 2000-2003, but it opened 2004 with a jump above \$ 6/tr.oz. and finished the year at \$ 6.50/oz. after spiking to \$ 8. Base metals and molybdenum also traded at 25-40% higher values than in the past few years, allowing Idaho's mines some much needed cash flow for financing development. Though the state's gold production is negligible after a boom in the 1990's, stable prices in the \$ 400 an ounce range led to renewed exploration activity by junior companies and a revival of interest in known districts.

For 2004, employment at the state's metal and nonmetal mines was tallied at 1,960 persons, up considerably from 2003 average employment of 1,769 people in the mining industry. Those numbers do not include an estimated 1000 persons working in mining-related chemical processing plants. The Bureau of Land Management mining claims office reported that in calendar year 2004, 1,177 claims were staked in Idaho, and 302 claims were closed.

Metal Mining

With major development projects underway, it was a very busy year at the two deep, underground silver mines operating in the Coeur d'Alene District (Figure 2). Since 1884, the Silver Valley has produced over 1.184 billion troy ounces of silver from high-grade, quartz-siderite-sulfide veins, and mining has long been the economic base of Shoshone County.

Hecla Mining added over 50 employees at the Lucky Friday mine in Mullan to work on a new \$8.5 million production drift from the 5900 level of the Silver Shaft to the Gold Hunter mine, which has been the focus of production since 1997 (Figure 3). The deeper access drift will allow extraction of ore intersected by drilling below the current mine workings, which are developed by a mile-long drift from the 4900 level. Approximately 4000 feet of the planned 4800 feet of drifting were completed; eight diamond drill holes tested for grade and strike extension of the Gold Hunter vein system. The expansion will be finished in mid-2005 and will enable doubling production from the 2 million ounces of silver produced in 2004.

The Lucky Friday workforce is very experienced and has been crucial in improving productivity to keep costs down in the deep mine. Engineers and miners are using slusher stopes

and customizing mine development to extract value from narrow vein sets within the Gold Hunter deposit. Hecla celebrated 40 years of being listed on the New York Stock Exchange.

Coeur d'Alene Mines produced approximately 3.5 million ounces of silver from the Galena mine at an average cash cost of \$ 5.46/oz. in 2004. Mining is mostly by mechanized cut and fill with some conventional stopes. Ore was mined largely from the tetrahedrite-rich 72 vein on deep levels of the mine, the Upper Silver vein and the 117 vein. For the year, Coeur spent \$1.6 million on exploration and development work, which included a drift west on the 3400 level and deep exploration of the Polaris Fault and 72 vein, along with 40,000 feet of diamond drilling. The work discovered several new veins and extensions; one drill hole intersected a very rich, but narrow, interval (0.9 feet at 51 ounces silver per ton) of the 483 vein. The ambitious exploration and development plan aims to delineate reserves and increase production to 7 million ounces annually at the Galena. The company has new mines in development in South America and Alaska, plus existing operations in Nevada and the Silver Valley.

Sterling Mining Company acquired the Sunshine mine, a 360-million ounce silver producer, for back taxes in 2001. Rising silver prices have boosted Sterling's interest in surface exploration of the property and work needed to return the Jewell Shaft to operational status. The shaft was inspected in April. Water had risen to the 3600 level, but the shaft and major stations survived well. Workers are focusing on rebuilding the hoist and communications and electrical systems within the mine. At year's end, Sterling awarded a contract for rehabilitation of the Silver Summit Tunnel to Atlas Fausett. The Silver Summit shaft, with its hoist, connects to the Sunshine and could serve as a needed escapeway.

Geophysical exploration was suggested in 1996 by Sunshine geologists but never followed up on. This year, Sterling ran a surface IP/Resistivity/Chargeability survey to look for structures and near-surface veins on the Sunshine property. They drilled 2,473 feet in three diamond drill holes to test geophysical anomalies. Hole #3 targeted overlapping resistivity and chargeability anomalies and intersected seven veins, including a near-surface, thin vein with 1530 ppm Ag (44 oz./ton Ag), plus high copper and lead. This is the first surface exploration done on the property in quite a while. Sterling has also been acquiring other property within the district, including that of Metropolitan Mines, just south of the Sunshine, and the Mineral Mountain Mining Company. At year's end, Sterling announced plans to expand the geophysical surveys to property leased from Merger Mines between the Consil and Coeur mines.

Formation Chemicals, Inc., reopened the Sunshine refinery at Big Creek on June 1, 2004, after a 3-month startup period to install new, state-of-the-art equipment and recertify the facility. The company, a subsidiary of cobalt explorer, Formation Capital Corporation, reopened the hydrometallurgical facility as a custom precious metal refining operation which purifies impure gold and silver-bearing material into bullion grade product.

The Silver Valley hosted its 17th Coeur d'Alene Mining Competition in August. Organized with assistance and judges from Central Mine Rescue, the popular competition featured underground miners from Idaho, Washington, and Montana in drilling and mucking contests, plus a family picnic and kid's activities, followed by presentation of the Lavon Fausett Memorial Scholarship Award.

Thompson Creek Mining Company operates Idaho's only large metal mine outside of the Silver Valley. The large, open pit Thompson Creek mine in Custer County produced approximately 15 million pounds of molybdenum concentrates and enjoyed prices approaching stratospheric levels, after several years of difficult conditions. Employment was up to 160 persons and last year's major stripping completed, so that Phase 5 mining was underway all year. Chinese consumption of raw materials and a steel shortage have been blamed for the sharply rising prices (\$ 20 per pound in late 2004 vs. \$ 2.50 per pound only a couple of years ago).

In reclamation news, U.S. Antimony completed the physical reclamation of the Preachers Cove mill on the Yankee Fork. The buildings were removed, and a capped impoundment with crushed calcite for pH control was installed. The Forest Service praised the work, and wolf tracks were seen on site after an early snowstorm. Kinross initiated final reclamation and closure at their DeLamar and Stone Cabin mines in Owyhee County. The mill and AVR plant were dismantled and sold, and reclamation of the pits and waste dumps continued. Approximately 2-4 years of reserve were left in the Stone Cabin pits. Meridian's reclamation work at the Beartrack mine was going well and rinsing of the heaps still provided a few hundred ounces of gold to the company.

Phosphate Industry

Caribou County in southeastern Idaho provides the nation with its only domestic supply of elemental phosphorus, as well as phosphoric acid fertilizer used principally in the Intermountain West (Figure 2). Production from the three active, open pit mines was 3.5-4 million short tons, with J.R. Simplot being the largest producer. Ore comes from the black organic-rich shales and phosphorites of the Early Permian Phosphoria Formation. Idaho ranks third in phosphate rock production, after Florida and North Carolina. A crude estimate of the value of the products after in-state processing is \$300 million, and over 1300 employees in southeastern Idaho work for the industry.

Simplot's Smoky Canyon mine was in full production mining panels E and C, and backfilling panel A with a clean cap of chert and limestone. Simplot initiated an Environmental Impact Statement (EIS) to expand to the south across the South Fork of Sage Creek to the Manning and Deer Creek areas. The plan has been protested by the Greater Yellowstone Coalition as the area is part of a roadless area; a Draft EIS is scheduled for mid-2005. The company had a sizeable exploration program, drilling over 60 holes at their Dairy Syncline project. Ore from Smoky Canyon goes via the Conda Pump Station through an 87-mile long slurry pipeline to the Don Fertilizer Plant in Pocatello.

Monsanto finished mining at Enoch Valley and started construction on a high-tech, encapsulated dump to isolate the naturally high-selenium-bearing waste shale. Impermeable shingles are placed over the seleniferous material, and bulldozers mounted with GPS receivers do the precision dirtwork. The Enoch Valley mine produced over 17 million tons since 1990. Current production is from the new South Rasmussen mine (Figure 4). Ore is trucked to the Soda Springs plant which operated at full capacity to produce over 230 million pounds of elemental phosphorous. Virtually all the product is used to manufacture Roundup herbicide. In 2004, Monsanto's Idaho operations became the first and only phosphorous supplier to have a quality control system certified under new ISO 9001-2000 system. The company drilled about ten exploration sites at their Blackfoot River Bridge project.

Agrium, a Canadian firm, operates the Rasmussen Ridge mine. The mine reported shipping nearly 2 million short tons of ore by rail to their fertilizer plant at Conda. Markets were good, assisted by the multiple hurricanes which temporarily closed some of the Florida production. Agrium announced that they took over the phosphate leases of Astaris, which withdrew from the business in 2003. Agrium will be mothballing the Rasmussen Ridge mine and moving over to Astaris' Dry Valley mine leases.

The Idaho Department of Lands, in conjunction with the federal land managers and other state agencies, awarded most of the 2004 Reclamation Awards to the phosphate industry. Much of the reclamation effort of the last few years has focused on new ways to minimize and prevent selenium release into surface and groundwater. Selenium is naturally enriched in the middle waste shales of the Phosphoria. Phosphate industry winners included: Agrium (Operations at

Rasmussen Ridge), Simplot (Exploration reclamation at their Wells Canyon, Manning Creek and Deer Creek leases), Monsanto (Special project of vegetative management at South Rasmussen), and Astaris (Special project to relocate and restore Upper Dry Valley Creek).

Other industrial minerals

Idaho's aggregate and other non-phosphate industrial mineral operations are significant contributors to the state's production and economy (Figure 1). Decorative stone was the hot commodity of the year, although the construction boom created good markets for aggregates as well. Several operators noted increased competition from lower cost suppliers in China and newer technology which allowed lower quality products. This is requiring companies to be more aggressive and creative in their marketing.

In north Idaho, Emerald Creek Garnet, a subsidiary of Western Garnet International, noted increased demand for industrial garnets, which it mines from paleoplacer deposits using washing plants and jig processing. The garnets are used in water jets and precision cutting, as well as abrasives. The company, which has 35 employees, was in the final stages of the NEPA process to expand into the floodplain of the St. Maries River. Nearby, the Forest Service runs a tourist garnet dig, where star garnets are a popular find for the hardworking and muddy tourists.

Ash Grove Cement reported good markets this year for cement from its Inkom plant and quarry south of Pocatello. They shipped about 300,000 tons of cement in 2004, mostly to markets in northern and eastern Idaho, as well as mines near Elko, Nevada.

Hess Pumice has had to shift its marketing strategy due to the influx of cheaper Chinese pumice into the television screen polishing market of Japan and the Pacific Rim. Hess significantly increased its tons of pumice mined from the Wrights Creek deposit, but sold it for lower value uses in building products. They also struck an agreement to supply cultured stone products for Owens-Corning and are building a 60,000 sq. ft. facility to manufacture construction materials at Malad. Hess-owned perlite producer Idaho Minerals Inc. contracted to supply horticultural perlite to a large Canadian distributor and have increased production to full capacity. They are building a new expander facility next to their existing plant in Malad in Oneida County.

Bear River Zeolite, partly owned by U.S. Antimony Corporation, had 15 employees working full-time to meet demand for increased sales of zeolite from the mine near Preston that opened in 2001. Prices were up as well, and the company had to add screens to increase mill capacity. Markets included water filtration and remediation, animal nutrition, odor control, and wastewater treatment. The company has an aggressive marketing plan for the natural K-clinoptilolite mined in Franklin County.

Unimin Corporation mined industrial sand at quarries near its plant in Emmett, and purchased an additional 86 acres to expand the Zierwold Pit. Volume sales were similar to last year, but the company reported a market shift away from container glass uses due to inroads from recycled glass and newer furnace technology. However, the Idaho sand has optimal properties for golf course use, an expanding market. The new Tamarack Resort near Cascade was one of their customers. The company has an 8-year safety record.

Decorative stone remained a hot item, and the Oakley Stone quarries on Middle Mountain in Cassia County, south-central Idaho, could barely keep up with demand (Figure 2). The durable micaceous quartzite comes in silver to gold colors and splits into thin sheets for use as a facing or flagstone. Sawed tiles and tumbled products are increasingly popular. Active operations in 2004 included Northern Stone Supply, Oakley Valley Stone, Scrivanich Natural Stone, and American Stone.

L and W Stone Corporation, a California-based company, extracted over 34,000 tons of their prized Three Rivers Stone from the quarry near Clayton in central Idaho's Custer County. In mid-year the company received approval from the BLM of a new Plan of Operations. The BLM was sued by John Marvel's Western Watersheds Project, but a temporary restraining order was issued, and the mine has continued operating. A court date is set for spring, 2005.

The nearby Ramshorn Quarry, which produced approximately 500 tons of slaty flagstone on private ground near Bayhorse, wants to expand onto public land. Other companies were noted to be prospecting for decorative stone and mineral specimens in the Challis region.

U.S. Geothermal spent about \$ 1million to clean out and flow test five old wells from the 1980's at the Raft River Known Geothermal Resource Area in southern Idaho (Figure 2). A Department of Energy grant subsidized some of the work, which resulted in four holes having commercial flow rates and temperatures. The company is pursuing permits and market contracts needed to construct a 10+ MW geothermal power plant. A second company, Idatherm, had geothermal leases in eastern Idaho but did not drill.

Exploration

Figure 2 shows locations of exploration projects across Idaho. Precious metals were the primary targets, although copper was important in a few projects. In addition to phosphate and stone, there was one other industrial mineral exploration project. i-minerals, inc. (formerly Alchemy) continued work at the Helmar-Bovill clay pits in Latah County. Feldspar with a quartz byproduct is the main target for i-minerals, and the company did geochemistry and processing tests of core from drilling in 2003.

Exploration activity in the greater Coeur d'Alene District increased considerably, in addition to Sterling's efforts at the Sunshine mine. Elsewhere in north Idaho, small underground miners, such as the Larson Group near Powell and Dan Vaughn at Pierce, focused on gold.

New Jersey Mining Company had an aggressive program with a portfolio of at least six projects in the Coeur d'Alene region. They drilled at their namesake, the New Jersey gold mine, staked a reconnaissance silver discovery, named the Silver Button, and drilled at two other properties. The Silver Strand silver-gold underground mine was in its final permitting stage with the Forest Service. The company added a flotation circuit and tested the New Jersey mill near Kellogg with ore from the Golden Chest project. The Golden Chest mine was the largest lode producer in the Murray district, north of Wallace. In the 1980's, Newmont drilled out a 230,000-ounce, open pit resource and intercepted one high grade vein. New Jersey acquired a lease-option on the private property in 2003, and this year they drove a ramp from surface down to intersect the historic Katie-Dora high grade vein and take a bulk sample for milling (Figure 5). They also drilled four deeper holes, hitting at least one ore-grade intercept below any known workings. In mid-December, New Jersey announced that it decided to exercise its option to proceed with mining the ore shoot exposed by the ramp at the Golden Chest. Resource calculations indicate the ore shoot contains 215 tonnes of ore per vertical meter at a grade of 13 g/tonne gold, using a 5 g/tonne cut-off grade.

Valencia Ventures, a Toronto-based company, signed an option in August with Beartooth Platinum to earn a 51% interest in the Idaho Gold Project, alias the Buffalo Gulch and Friday-Petsite properties near Elk City in northern Idaho. In June, Beartooth Platinum, formerly Idaho Consolidated Metals Corp., drilled both properties (Figure 6). They drilled 412 meters in four HQ diamond drill holes at Buffalo Gulch to confirm grades from 150 existing RC holes. In the early 1990's, Buffalo Gulch was fully permitted as an open pit, heap leach mine with an indicated resource of 5 million tons at 0.023 oz./ton gold.

Kimberly Gold Mines purchased the Rescue Mine and mill at Warren in central Idaho. The mine is developed on a gold-quartz vein system in granodiorite. Kimberly did an extensive environmental clean up of the site and replaced the collapsed roof on the mill building, as well as doing some development and repairs to the underground workings. They are hoping to mine ore in 2005. Unity Gold-Silver Mines and Sidney Resources were also working veins at Warren.

Elsewhere in central Idaho, Vista Gold held Stibnite, Jack Walker did legal negotiations and geochemical work on the Golden Hand, and Nevada Contact drilled seven holes at Iron Creek before returning the property to its owner.

In the Salmon region, Wave Exploration worked on the 970-acre Musgrove Creek property they acquired in 2003. Musgrove was discovered by Atlas Precious Metals and drilled later by Newmont; Wave determined a NI43-101 compliant resource of 314,000 ounces gold grading 1.22 g/tonne from the previous work. They did rock and soil geochemistry and drilled four reverse circulation holes to test the known Johnny's Point mineralization and another target.

Formation Capital Corporation had a very busy year on their Idaho Cobalt project in the historic Blackbird Mining District of Lemhi County. Rising cobalt prices (as much as \$ 20 per pound) and successful financing allowed aggressive resumption of the permitting for their proposed underground cobalt-copper-gold mine in the Salmon-Challis National Forest. Hatch Ltd. has been hired to do a 43-101 feasibility study on the project, which would mine the RAM deposit. Formation drilled 24,871 feet of core in 28 holes and did extensive surface geologic mapping (Figure 7). Drilling was slowed by poor ground conditions, but results confirmed the down dip extension and lengthened the known strike length of the deposit to 2,400 feet. On section 8+00S, R04-13 intersected the ore horizon at 712' with a true width of 19 feet grading 0.93% Co, 2.12% Cu and 0.0326 oz./ton gold. On section 4+00S, R04-26 intersected a true width of 4.2 feet averaging 1.44%Co, 1.95% Cu, and 0.0449 oz./ton gold, at 945' depth. Mineralization is still open along strike and down dip. Drill results will be used by Mine Development Associates to complete an updated reserve. A Draft EIS is scheduled to come out in the first half of 2005.

In March, Trio Gold Corporation announced a deal with Sultana Resources LLC to explore Sultana's Empire Mine property near Mackay in Custer County. The polymetallic skarn was drilled by Cambior Exploration in the mid-1990's, and a drill-indicated oxide copper resource of 27 Mt of 0.42% Cu delineated from 47 core holes. A 2001 engineering report recalculated the resource and noted that the open pit deposit was amenable to flotation and heap leach processing. Trio planned to drill the area, which is near the route of a local historic tour of Mackay's Mine Hill.

Kilgore Gold acquired the Kilgore epithermal property in Clark County in eastern Idaho last year. This late Tertiary, hot spring precious metal system was discovered by Kennecott and explored extensively in the last decade by Placer Dome, Echo Bay and others. That work delineated a resource of approximately 487,000 ounces of gold hosted in the volcanics. Kilgore drilled six holes, mainly on the "Dog Bone Ridge" geochemical anomaly west of the previously drilled areas. In spite of considerable drilling problems due to the intense alteration, one hole intercepted a thick zone of low grade (170' of 1.25 g/tonne Au) which included 10' of near half-ounce material, and Hole 5 discovered zones with abundant realgar and stibnite.

In southwestern Idaho, Nevada Contact held the Blacksheep epithermal prospect and Milestone Fault zone north of the DeLamar mine in Owyhee County. Desert Mineral worked on a plan to open a small open pit gold mine in the Neal District east of Boise. Mosquito Consolidated acquired the large Cumo property northwest of Idaho City. This deep molybdenum system was discovered and drilled by AMAX in the 1970's; a resource of 444 million tons at 0.135% Mo was delineated. Mosquito is reviewing the old data and plans on drilling in 2005.

Atlanta Gold Corporation, a subsidiary of Twin Mining, continued permitting work for the proposed Atlanta open pit, heap leach gold-silver mine in the old Atlanta Mining District of Elmore County. Over 200,000 feet of past drilling was used by Behre Dolbear to calculate a mineable reserve of 13.7 million tons at 0.06 oz./ton gold in two pits. At current gold prices, calculated rates of return are over 20%. Fish and water surveys, geotechnical studies, and mine plan optimization were ongoing. Tetrattech is preparing the EIS for the Boise National Forest; a draft should be released in 2005.

Idaho Geological Survey activities

Over 60 new digital geologic maps are now available on the Idaho Geological Survey website (www.idahogeology.org) and can be downloaded. Funded by the USGS Statemap program, the maps include areas near Moscow and Lewiston, Orofino, Sandpoint, and Twin Falls. The Mines and Prospects database, which includes over 8,000 historic mines in the state, is now available as a downloadable file or CDROM. GeoNotes and summaries of current minerals activity are also available.

Illustrations

Figure 1. Idaho 2004 Mineral Production, based on preliminary USGS data.

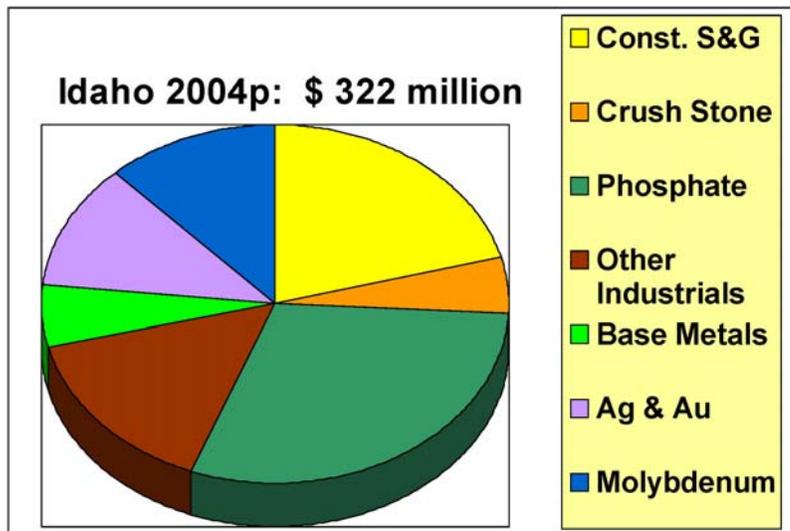


Figure 2. Exploration Map, with Coeur d'Alene and Phosphate Districts.

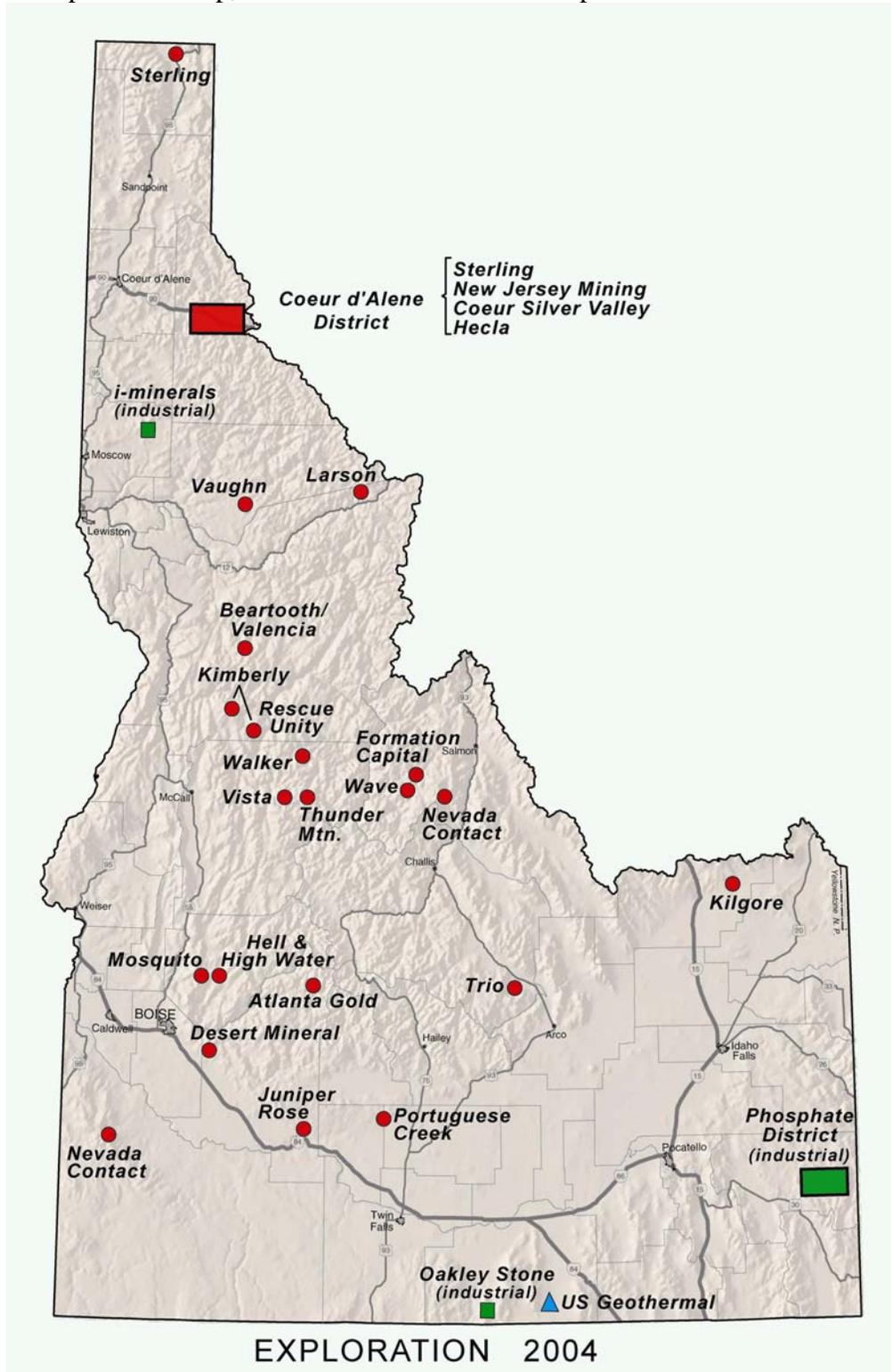


Figure 3. Hecla's Lucky Friday Mine



Figure 4. Monsanto's South Rasmussen Phosphate Mine



Figure 5. Golden Chest mine underground work by New Jersey Mining Co.



Figure 6. Valencia Ventures, Drill at Friday-Petsite, June 2004



Figure 7. Drill Core (R04-5) from RAM deposit, Main Zone, Formation Capital Corporation's Idaho Cobalt Project.

